A PRIMEDIA Intertec Publication NOVEMBER 1998

Broadcast ENGINEERING

THE JOURNAL OF DIGITAL TELEVISION

A/V delay in DTV

Maintaining lip-sync

Testing 292 HD signals

A whole new game

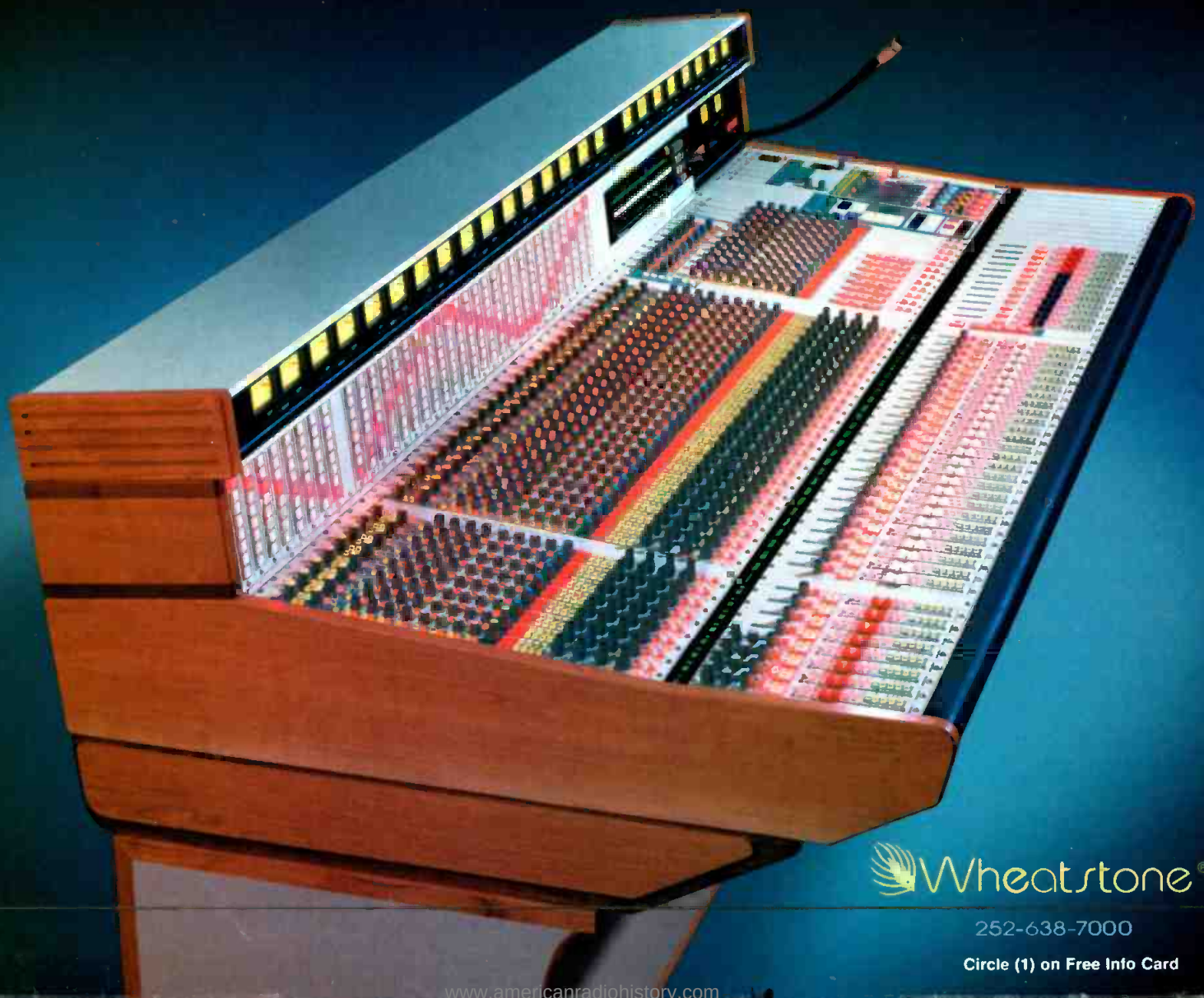
Virtual sets

Software studios

LIVE TV

The Way It HAS to Be

TV-1000 and TV-80
Audio Consoles



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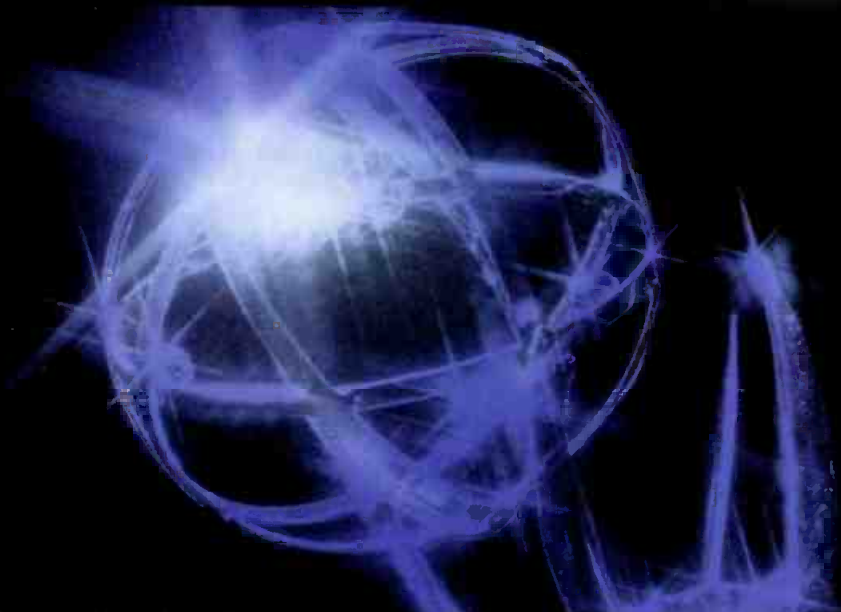

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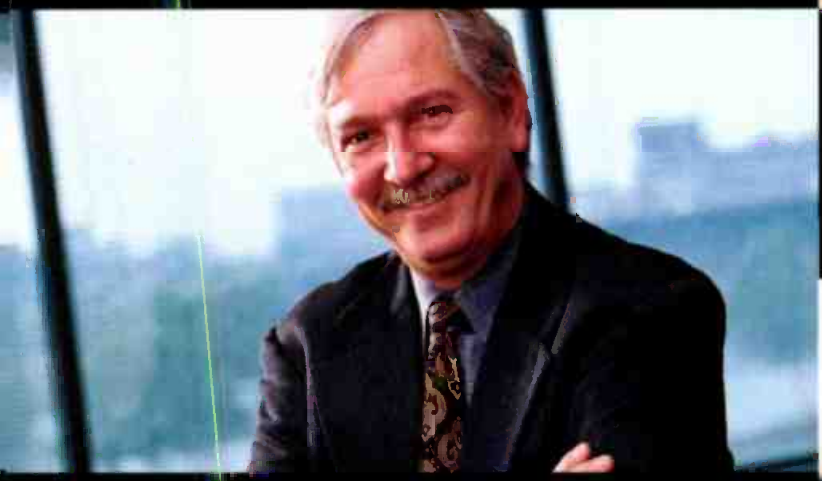
DEL PARKS VICE PRESIDENT, ENGINEERING & OPERATIONS, SINCLAIR BROADCASTING

Support

Panasonic has responded quickly everytime we've called. They have gotten right on top of the few issues we've had. Panasonic is very responsive to our questions, doing all you could ask.

DAVE FOLSOM VICE PRESIDENT, TECHNOLOGY, RAYCOM MEDIA



Cost of Ownership

We have 18 months of experience with an extensive amount of DVCPRO equipment, some 60 camcorders, 250 decks. The cost of ownership has been very reasonable. A DVCPRO tape costs $20, but we get 350 passes! We're very pleased.

KEITH BLAND SENIOR VICE PRESIDENT, TECHNOLOGY, BENEDEK BROADCASTING

Ruggedness/Reliability

I just returned from shooting in the dustiest environment in North Dakota and my DVCPRO camcorder worked great. I haven't lost a shooting day in the two years I've been using DVCPRO, that says it all.

JON ALPERT NINE-TIME EMMY AWARD-WINNING CAMERAMAN AND REPORTER

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November 1998
Volume 40
Number 12

Broadcast ENGINEERING
THE JOURNAL OF DIGITAL TELEVISION™

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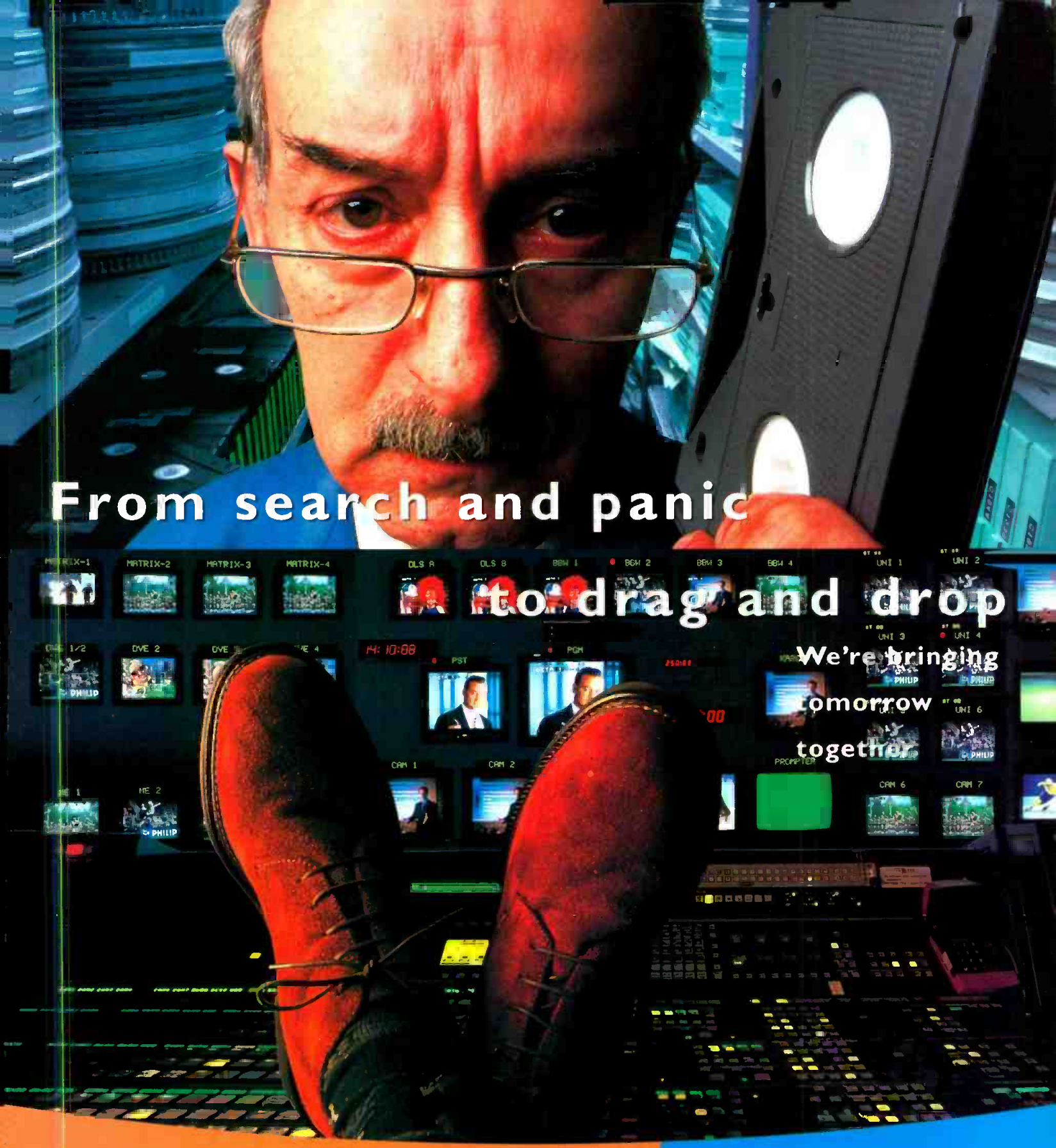

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ON THE COVER: *Cover design by BE art director, Andrew Brown. Photography courtesy of Videotek. Shown is the Videotek VTM-200 multiformat monitor.*

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Contact the Editors

Questions? Contact:
Dana Guthrie
dana_guthrie@intertec.com
913/967-1905 fax

FREEZE FRAME

A look at the technology that shaped this industry.

Do you remember?

Do you remember when Tektronix introduced the 1480 scope.

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Reader Feedback

Oops!

Because of a printer's error, page 96 was left out of the October article "Digital Audio Routing," by Ken Hunold. In its place, page 95 was repeated. We apologize for the error. A correct version of the article appears on our web site: www.broadcast-engineering.com. If you would like a fax version of the complete article, fax your request to Jennifer Lowe, editorial assistant, at 913-967-1905 or call 913-967-1739 and leave your name and address.

73's the telegraph

Two comments on your editorial concerning "The Passing Era," which correctly stated that the radiotelegraph will disappear from ships at sea March 1, 1999.

First, you failed to mention that the new replacement systems, namely GMDSS and DSC SSB/FM, will not be completely implemented at shore stations until 2005 due to technical problems. Prototype systems in operation now have a 97% failure rate.

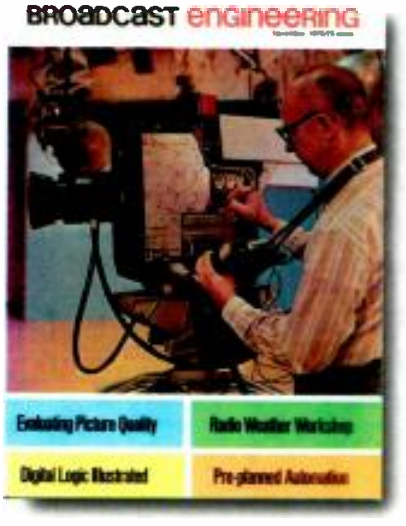
Second, the IMO's goal of eliminating the Radio Equipment Officer (REO), currently required to be onboard all ships now, will soon be accomplished. The modern day REO, although having the required FCC Commercial Radiotelegraph license and a good radiotelegraph ability, actually spends little time with that mode. Instead, the REO oversees the operation and maintenance of all onboard communications, including CW, SSB, FM, SITOR, FAX, satellite, radar and internal systems. This person can only be unavailable now due to major illness.

After March 1, 1999, no one on the ship is required to have this level of technical skill. All that's required is a GMDSS operator license, which is roughly equivalent to the old third-class radiotelephone permit. There will also no longer be any requirement for watch standing or logging.

All of this sounds amazingly similar to what's happened in the broadcast industry — thanks to the FCC. The moral of my story: If you are planning to take a cruise, I recommend doing so before March 1, 1999!

Dean Sever
Electrical Engineer & Broadcast Consulting Engineer

Dean,
Guess I'll hold off on my Love Boat *cruise.*
Brad Dick
Editor



What camera is that?

(In response to the October "Freeze Frame")

The camera is a Norelco LHD-1. I had three of them in a studio, four in a trailer and one on a film chain. The insides are very familiar! Now I use the prisms as teaching aids in my Media Electronics class.

Rick Pitchford, CSTE/CSRE
Video/Audio
Communication Center
Cleveland State University
Cleveland, OH

Rick wins a Broadcast Engineering *CD case for his entry. You can win, too. Watch for upcoming questions.*

Quad lives!

(In response to the August feature, "Digital tape acquisition")

You want to know if anyone recalls the battles between formats, huh? I'll have you know that I have five, yes five, two-inch quad machines on-line playing commercials. That is how we pay the bills. That is also the way we paid for the M-format machines that have been replaced with MII machines and, of course, the 1-inch machines for production. Now we have DVCPRO for news and ENG.

We have two Ampex 1200s, two RCA TR 60s, one RCA TR600, two Ampex VPR 2Bs, 12 Panasonic 65 and 66 MIIs, a couple of Panasonic-type M AU 300s. Add to this the new Panasonic DVCPRO camcorders and studio decks and the server for digital playback.

Hummmm, acquire on digital, edit on NLE, then master to quad for play to air. We really are a broadcast museum.

Don Eckis
Pasco, WA

Yeh Don, but can you play my old stereo Beta consumer tapes?
Brad Dick
Editor

Send your comments to:
brad_dick@intertec.com or
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MOUNTAINGATE

CRT type monitor around? This little fella weighs in at under 20 pounds, less than a third of CRT displays of comparable size.

The more important applications for this technology are in the areas of text and graphics. When asked about its application in HDTV, Dr. Robert Wisnieff, manager of IBM, said it is possible to display two full high-definition images (1920x1080) on the prototype. However, this high-resolution display looses its impact if you stand more than 18 inches from the screen. "Anything beyond that and you've got more pixels than necessary for viewing the image," said Wisnieff. "You may as well have a 60- to 80-pixel conventional device," he added. Although IBM has not yet announced product plans for this technology, you can bet it won't sit on the shelf for long. For more information, check out IBM's web page at www.research.ibm.com. ■

Labeling DTV channels

So how will the viewers distinguish between a station's analog signal and its DTV signal, much less its multichannel DTV signals? The standards have been set and they are really quite simple. There will be a two-number tuning process. Because most viewers are familiar with the current analog channel, it all starts there. For example, in New York, WCBS-TV (analog) is on channel 2 and WCBS-DT (digital) is on channel 56. Tuning a DTV receiver to 2-0 will cause the receiver to receive the analog service. Tuning the DTV receiver to 2-1 will cause it to receive the digital service. If WCBS-DT were transmitting multichannel, its second digital program would be received on 2-2, its third on 2-3, and so on.

Probably the biggest proponent of multicasting is Sinclair Broadcasting, which has demonstrated the technology in Baltimore. There was also a multicasting demo at NAB98.

The key to multicasting is bandwidth management. For example, video compression looks for the changes in video information. If you are transmitting a cartoon that doesn't have much detail or change in video from frame to frame,

What about translators for DTV?

Until the advent of DTH Satellite service, many viewers depended on translators for their TV service. Most of the TV stations in Portland, OR, have from 50 to 75 translators that serve the beaver state. The 202nd market, Bend, OR, has eight translators. With digital television making its presence known, what's to become of these translators, and how will folks get DTV signals in more remote areas?

The need for translator systems to serve remote areas won't go away with DTV. Analog systems, like that shown here, will need to be updated for digital coverage.

The folks who brought you the ATSC standard have been hard at work trying to find answers to some, if not all, of these questions. Advanced Television Technology Center (ATTC), based in Alexandria, VA, and formerly known as the Advanced Television Test Center, in a development with "far-reaching implications for digital television (DTV) implementation," announced that it has successfully transmitted a DTV signal to a remote area using its innovative on-channel repeater.

According to ATTC Executive Director Paul K. DeGonia, "This new technique will potentially help the nation's broadcasters deliver high-quality DTV service to unserved areas, including those blocked by mountains and other obstructions. Further testing in other locations is necessary, but the ATTC's on-channel repeater could mean that a major obstacle to DTV implementation has been overcome, ensuring that viewers at the outer reaches of the service area will be able to experience digital television's vastly improved images and CD-quality sound."

In tests conducted earlier this year for a group of high-priced broadcast executives and government policymakers, the ATTC transmitted a live, over-the-air DTV signal from PBS' Washington, D.C., station WETA (channel 34) in Arlington, VA, to a tower 44 miles west-northwest on Neersville Mountain in West Virginia. At the Neersville tower site, the repeater unit filtered and reamplified the signal, then retransmitted it into a valley five miles west of the mountain. The output power of the repeater was 120W, and the Andrew antenna system pattern was 60°. The signal was ultimately received and displayed on a direct-view HDTV receiver at the Charles Town, WV, Racetrack Clubhouse.

The participants in this event were ATTC, which designed and built the repeater/translator; Panasonic, which provided the digital receiver; Harris Corp., which provided the digital transmitter; Andrew Corp., which did the antennas; and Sencore, which provided the transport stream player. ATSC furnished prerecorded programming.

"The on-channel repeater demonstration has been a collaborative effort between the ATTC and WETA, one of the stations leading the digital-television revolution," said DeGonia.

If you are wondering who makes up the ATTC, its membership list includes ABC, CBS, PBS, Mitsubishi, Matsushita/Panasonic, Philips, Pioneer, Samsung, Sony, the Korea Electronics Technology Institute and the Association for Maximum Service Television (MSTV).

For additional information on the ATTC, check out its web site at: www.attc.org. ■

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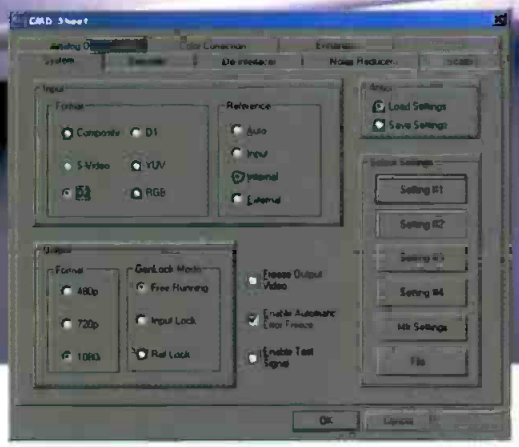

WINDOWS NT CONTROL SOFTWARE

On June 24, 1998 Yves Faroudja, founder and chief technical officer of Faroudja Laboratories, was awarded the prestigious Charles F. Jenkins Lifetime Achievement Award from the Academy of Television Arts & Sciences for the development of key patents in the area of video processing, encoding, decoding, enhancement and noise reduction.

The award winning Digital Format Translator™ line from Faroudja provides the solution to broadcast studios and production houses that need HDTV-like images from interlaced analog and digital sources.

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transmission will not require a great deal of bandwidth. A sports event, on the other hand, with all its activity, detail and motion, requires a great deal of bandwidth. Software developed to monitor the video content of each channel in a multichannel environment and "ration" the bandwidth to each — according to the needs of each channel in the multichannel system — would fill the bill. There are several encoding solutions out there for this problem. See *BE's 1999 Buyers Guide and Web Reference* for a list of companies that make such equipment. ■

The UHD-3200 All Scan Monitor displays all 18 formats of DTV.

high-definition programming via satellite to a national and international subscriber base equipped to receive and display high-definition signals. It only seems logical that they'd have a need for a monitor of this type. For more information, see UM on the Internet at www.unitymotion.com. ■

Eighteen monitors or one with 18 formats?

A number of fine monitors are available to monitor HD pictures, but the ones I've seen only display one of the 18 video formats. If your facility needs to monitor multiple formats, how will you decode and view them? So far It certainly doesn't make much sense to buy several types of monitoring equipment.

Fear not. Someone has come to the rescue by developing a monitor that does it all — that's right, all 18 formats. Unity Motion has announced the introduction of its new UHD-3200 All Scan Monitor. Manufactured by Princeton Graphics, this 32-inch monitor comes with a 16:9 widescreen aspect ratio. Unity Motion claims that, unlike other monitors, it displays (via projection) all 18 formats of DTV.

Irrespective of the video source — digital, analog or high-definition — the picture is reported to be sharp, clear and consistent because the UHD-3200 includes an internal line doubler, which simulates HD quality for non-HD video and broadcasts.

Joe Kane, a leading authority on picture quality and one of the designers of the monitor, adjusted the specifications and conducted picture-quality tests. "Given the capability of any DTV source, you'll see more detail in this set than any other consumer direct view set the market has to offer," said Kane.

Unity Motion has other fish to fry, and the monitor is a logical development. Billed as "North America's Only HDTV Network," UM's High-Definition Distribution System (HDDS) distributes

Changes in the 2 to 3GHz and 18MHz bands

According to a Notice of Proposed Rule Making (NPRM), dated September 17, 1998, the FCC (Docket #IN-98-172) proposes to redesignate a portion of the 18GHz (17.7 to 20.2GHz) band among the various allocated services currently in order. The reason the FCC gave is to "make more efficient use of this spectrum." The FCC is also proposing to allow blanket licensing of fixed-satellite service earth stations in the KA-Band and allocate additional spectrum for the Broadcast Satellite Service.

Commercial and educational television are not the only TV services migrating to digital delivery of their signals. In a separate action, also on September 17, the FCC (in MM-98-52 by R&O) approved two-way digital instructional television fixed service (ITFS) and multipoint distribution service (MDS) licensees to offer digital service.

Educational institutions have used ITFS for years to broaden the classroom environment. In the past, standard-definition NTSC TV signals were broadcast in the 2 to 3GHz range, at low power (typically 10W), in four-channel groupings to sites equipped to pick up these signals. As anyone who has worked with any of this type of equipment knows, 10W into low-loss cable and a good gain antenna will do wonders at covering large areas, assuming a comparable receiving antenna system at the other end.

With ITFS, students can follow along with the classroom instruction as it is taking place. If a student at the remote site has a question, the ITFS equipment is designed with a backhaul, aural-only RF circuit, in-band, to permit students to ask questions or interact with the instructor.

MDS is also known as wireless cable operating in the same range of frequencies as ITFS. Because MDS and ITFS operate in the same band, some school districts have gotten licenses for ITFS and have rented the unused channels out to MDS operators who thought they needed additional channel capacity, an unusually lucrative arrangement for both parties.

The FCC says approval of this new, two-way digital ITFS and MDS communications service will provide new services and faster Internet access for users. Although is possible for the MDS users to have a backhaul system similar to ITFS, this system doesn't seem reasonable, since only one person could use it at a time. And how many times have you heard of someone surfing the Net for hours?

For additional information on these matters, see the FCC's web site at www.fcc.gov. ■

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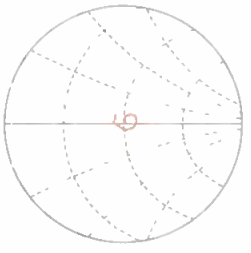

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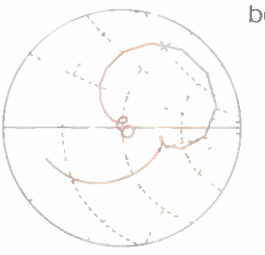

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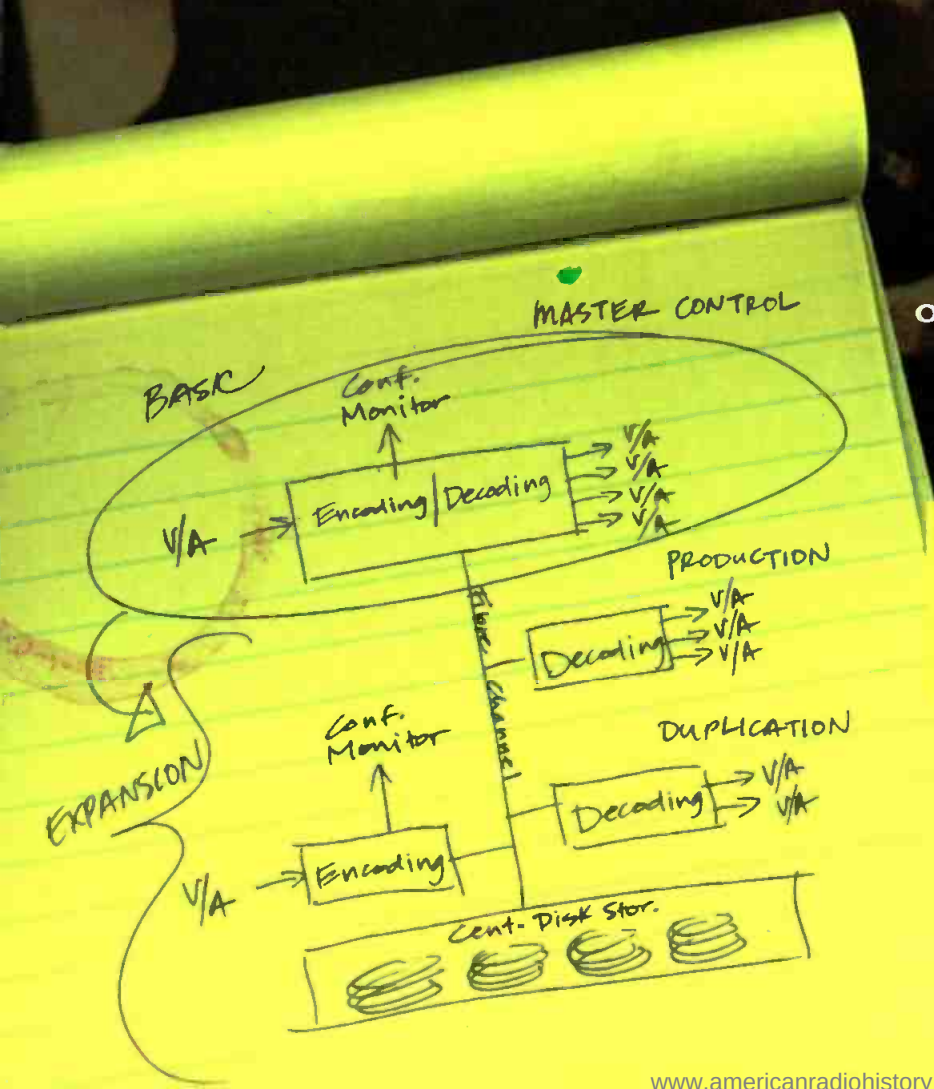

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What we

Emmy-winning technology

BY DANA GUTHRIE, ASSOCIATE EDITOR

How are the companies that set new standards in broadcasting technologies formally recognized? At the Technical Emmy Awards, of course. Held in New York City on October 12, the ceremony, presented by the National Academy of Television Arts and Sciences, recognized the industry's leaders and the innovative products and technologies they have developed. Not surprisingly, this year's awards went to some cardinal players in the digital revolution.

Dan Wright, Scitex president, accepted the Emmy for Scitex Abekas disk recording technology.

Scitex received an Emmy for the development and implementation of digital uncompressed tapeless recording and playback technology. The award recognizes the pioneering role of Abekas disk recording technology. "This is the fourth time the Academy has recognized Scitex Digital Video for advancing the state of the art in digital video technology," said John Cannon, president of the Academy. Dan Wright, Scitex president, accepted the award (see photo).

Two awards went to Panasonic, the first for its breakthrough work in the development of the DVCPRO small-format digital component videotape format. The second Emmy, shared jointly with NHK (Japan Broadcasting Corporation) was presented for the development of its high-definition intrafield compression processor that integrates with Panasonic D-5 HD VTRs. Masahiko Kajitani, executive vice president, AVC Company, MEI, accepted the awards.

Quantel was awarded an Emmy for the development and implementation of digital uncompressed tapeless recording and playback technology for TV broadcast and post-production operations. The award recognizes Quantel's Dylan disk technology, an array of SCSI disks that provides the true random access performance at the heart of Quantel's range of high-end video and film products, including Henry, Editbox, Hal, Clipbox and Domino. Accepting the award were Tony Searby, Quantel head of research, with Alec Cawley and David Steele from Quantel's research and development team based in Newbury, UK.

The Academy presented Dolby Laboratories an Emmy for pioneering development of a multichannel digital audio bit-rate reduction system. The Dolby Digital 5.1 audio system has become the audio standard for ATSC transmission and DVD systems. Craig Todd, senior member of Dolby's technical staff, accepted the award.

Technical Emmy awards are usually given to a company, but one company's post-production studio actually took an Emmy home this year. The Academy recognized Sony Pictures High Definition Center for outstanding achievement in the development of a high-resolution digital film scanner. The award, which the facility shares with Kodak and Philips, recognizes the facility's early work and patents on film-to-video conversion techniques, which it has employed to transfer numerous movies to high definition. Sony Pictures' William Humphrey, executive vice president, digital studios division, and Dr. Robert Hopkins, vice president and general manager of the Center, accepted the award.

The Australian Broadcasting Corporation Channel 7, Filmtreat International and Piclear were also honored with Emmys for their technical achievements. ■

Don't forget the data in DTV

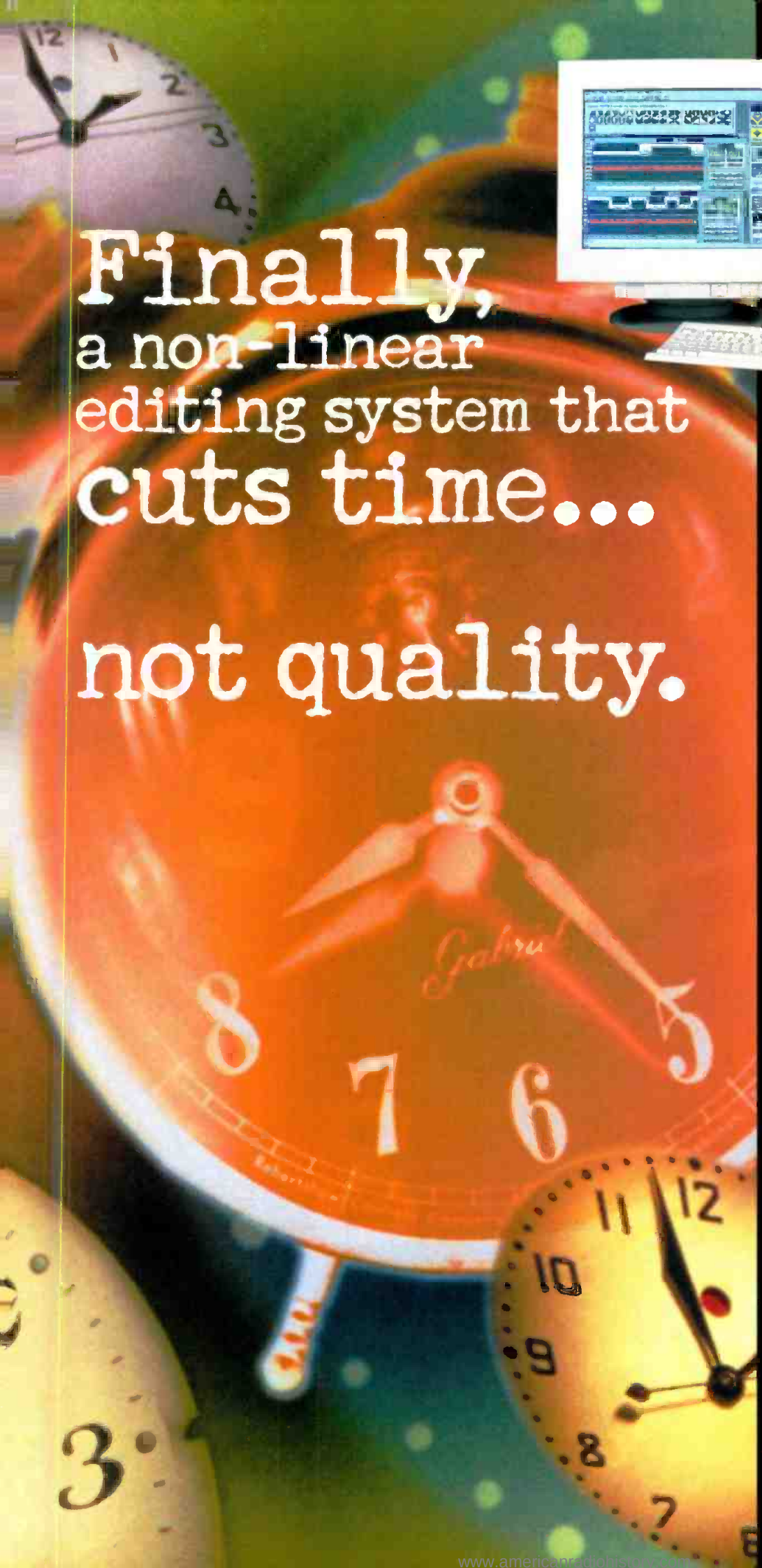
There's been a lot of press about the scramble to find tower space, locate the right equipment (at the right price), and meet deadlines to launch digital television, but there hasn't been much press about the benefits or services in the area of the data part of the bitstream. The bitstream reads picture, sound, picture and data. So why not put it to work?

Broadcasters stand to see substantial increases in revenue if they use the digital area of their signals in the same way the satellite, direct-to-home (DTH) folks have been using it for some time.

For nearly a year, this news section has reported on the high-definition (720/1080) part of DTV. Yet realistically, there isn't enough program material to reasonably support the HD format, and there won't be for sometime to come. Nat Ostroff, of Sinclare Broadcasting, proposes a viable solution to the situation: Sinclair has successfully demonstrated multichannel broadcasting. Ostroff plans to have most all of his company's 65-plus TV stations do multicasting. Just think, instead of addressing just one demographic in a given market, Sinclare will address as many as five. This method will probably command a larger share of the available advertising revenue in each of these markets to find its way into Sinclair's bank account.

Broadcasters are like inductors. However, they resist any change in current flow. To be successful in the future, they must break old patterns and look at new ways of doing things, which will bring in additional revenue. We don't have to reinvent the wheel, either. Look at the way allied industries work, such as the DTH folks and cable providers (AT&T isn't trying to buy TCI because it's a money pit).

Offering features from your station — such as conditional access (CA), viewer authorization systems (subscriber management systems), electronic program guides (EPG), data broadcast services, pay-per-view (PPV) and premium channels — are



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The all-in-one, Windows NT-based system delivers all this because of 4:2:2 component digital processing at an impressive 270 Mbps data rate. The end results are finished productions that are not only completed faster and more efficiently than ever, but also are virtually indistinguishable from D1 uncompressed recordings.

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only the beginning. It should be obvious that there is a market for these features. ■

DTV game plan

In sickness or in health and, until analog do us part. Here we go, like it or not. The marriage of television to the digital delivery of signals was consummated on the first of this month. Many of you have surely wondered what is happening at those stations, on the local level, required to make the migration to DTV during the first window — November 1, 1998 to May 1, 1999.

There's been a great deal of press about what the major networks are doing to provide digital television to their affiliates. Nearly every network in New York and Los Angeles is preparing major facilities to generate and distribute digital signals of one kind or another. To see what these plans are, I undertook an informal survey to find out what kind of problems networks are having implementing digital television and how they solved those problems. Their solutions may be applicable, in scaled-down form, to local stations.

The FCC regulations require all affiliates of the four major networks in the top 10 markets to have their digital equipment on-line and transmitting before November 1. The math is simple: Ten markets multiplied by four networks equals 40 stations. To find out how these "local folks" are making out, a simple questionnaire was sent to the four networks: ABC, CBS, Fox and NBC. In case you are suffering from Rip Van Winkle syndrome, the top 10 markets, in order, are: New York, Los Angeles, Chicago, Philadelphia, San Francisco/Oakland/San Jose, Boston, Washington, D.C., Dallas/Ft.Worth, Detroit and Atlanta.

The questionnaire included three basic questions:

1. What problems have you encountered, or are you encountering, in the implementation of local digital television?

2. Besides what the networks will be providing, what are your plans for local origination? If you plan on local origination, will it be high-definition or standard-definition; will it be progress or interlace, and that what scan rate? Do you have any innovative solutions (e.g., a HDTV telecine)?

3. Do you have any plans for doing multichannel broadcasting in your digital TV allocation?

Most of the chief engineers, directors of engineering, and vice presidents of engineering who responded indicated that they are still making the transition from analog to digital 601. Approximately a third were in the planning stages, a third actually were in the transition, and the remaining third are currently operating 601 digital facilities and are transmitting only NTSC.

Responses to the first question were practically the same. There were concerns about equipment delivery dates. In the markets where several stations share the same tower structure, there were concerns about finishing work before the onset of winter — one chief engineer said he even had a problem finding the guywire needed to reinforce his tower.

Two-thirds of respondents said they would be on the air by November 1, or soon thereafter, and the remaining third said they would make the May 1 deadline. Though everyone planned on making the deadline, some said it might be close.

As for the second question, "What are your plans for local origination," responses were virtually carbon copies. It

Ours, theirs or Europe's?

A potentially important member of the global HDTV community recently began tests. China is deliberately examining both the ATSC and DVB standards and is building systems that comply with both standards, according to an industry observer. "It may be that marketplace developments will be at least as important as the technical advantages of the standards," said the observer.

The trial run of China's prototype high-definition television (HDTV) system, announced by the Ministry of Science and Technology, will boost China's developing TV industry and government drive to build a base in intellectual property for their emerging digital technologies.

The terrestrial broadcast trials from the government's Central Television Tower in Beijing were completed in September, officials said. Besides making China the fourth nation to develop a working HDTV system, the two-stage HDTV initiative spawned a total of 26 patent applications, officials said.

China's prototype system serves not only as a technology testing platform, but also as a vehicle for Chinese HDTV standards. China is deciding whether to adopt the U.S. ATSC or the European Digital Video Broadcast (DVB) standard. South Korea adopted the ATSC standard in November 1997, and Taiwan followed suit in May of this year.

China began its HDTV project in November 1994. At the time, they formed an HDTV R&D coordinating team and began formulating an HDTV strategy. The first step was to develop a prototype system in two years. The second called for commencing trial broadcasts by 2000.

According to Chinese government estimates, TV sets, components and recording equipment account for 43% of the Chinese electronics industry's revenue. At first glance, that may not seem like much, but with a population base the size of China's, that's a formidable number. Meanwhile, proponents of the U.S. and European transmission standards are closely monitoring digital TV developments in China to determine which way the government will go.

"China, of course, is an immense market and is extremely important in our efforts to promote adoption of the ATSC standard," said Robert Graves, the U.S. group's chairman, at a broadcast exhibition in Beijing in August. ATSC is working with broadcasters and government officials in Hong Kong in hopes of getting a leg up on its European competitors. ATSC conducted two HDTV broadcasts in China last year. ■

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appears that, initially, there will not be local origination at the stations surveyed. Respondents said they would simply bump up their NTSC signals and transmit them digitally. There appears to be no interest in standard or high-definition digital origination in the foreseeable future. One chief engineer in Philadelphia responded, "We will not locally insert our own HD programming or commercial material for at least a year and a half, mainly due to the lack of adequate automation to handle two program streams." Several of the stations said they have no business plan that would support HDTV at this time.

None of the stations participating in this inquiry have given serious consideration to multichannel transmission. Most are primarily concerned about just meeting the deadline of getting digital TV signals on the air. If stations will not locally insert their own HD material for at least a year and a half, it is apparent that they cannot handle the five to six channels needed for multicasting.

To date, it appears that Sinclair Broadcasting is the only broadcast group giving any serious consideration to multicasting. A respondent at WETA, the PBS affiliate in Washington D.C., said it is PBS' intention to broadcast high definition at night and multichannel during the day.

This survey indicates that the independent stations, those without the luxury of networks feeding them high-definition signals, will be the true pioneers in digital television. It is becoming more apparent that other broadcasters, like Sinclair, may be the ones to blaze the trails into multicasting. Because there is not much excitement at the network stations in the top 10 markets, except for the installation of an upconverter and digital transmission system, keep an eye on the non-affiliates to see what's really happening. ■

DirecTV Japan advertisement on the side of a Boeing 767-300.

High-flying "Burma Shave" signs

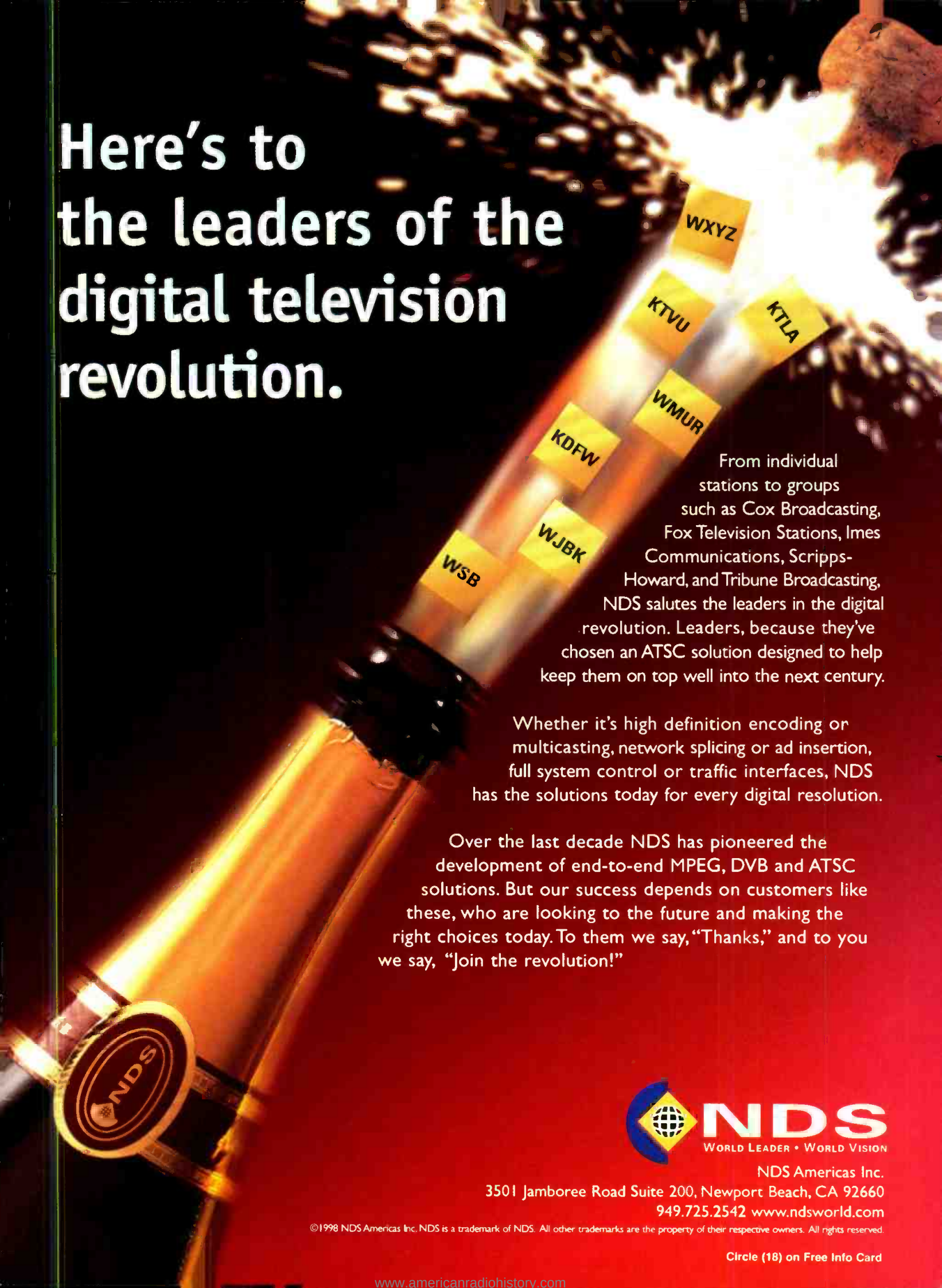
Airplanes have been dragging banners of all sorts behind them for years, and "sky writers" have left their puffy messages in the sky for all to see. But DirecTV has found a new way to take marketing higher than ever.

Don't be surprised the next time you're at 30,000 feet and an ad for an upcoming TV show flies by. No, it's not a wayward billboard. Companies can now purchase advertising space on the sides of aircraft, much the same way they can with city buses.

Skymark Airlines, a Japanese carrier, will carry advertisements for DirecTV Japan on the side of one of its aircraft.

"We wanted to offer the lowest fares we could, and to do so, I asked (DirecTV president) Mr. Masuda to help us out by letting us carry DirecTV's ad," said Sawada, president of Tokyo-based travel agency H.I.S. Company, Skymark's major shareholder.

For a fee of about $348,200, the Boeing 767-300 will carry an ad depicting athletes and musicians from DirecTV Japan's program lineup for one year. Nothing was said about space being purchased for DirecTV to advertise Sumo wrestling. ■



FCC Update

EEO rules suspended

BY HARRY MARTIN

The FCC released an order on September 30 suspending Equal Employment Opportunity reporting requirements for broadcasters, including the Annual Employment Reports due that same day. In a statement accompanying the FCC's order, Chairman Kennard indicated that he hoped to propose new requirements soon and encouraged voluntary filing of the EEO forms. A different statement from Commissioner Harold Furchtgott-Roth noted that all of the EEO rules, not simply the reporting requirements, were legally voided by the Court's decision in the Lutheran Church case. He further noted that broadcasters who voluntarily comply with the voided rules could be placing themselves in legal peril and that he could not commit to adopting new EEO rules.

This latest FCC action comes in the wake of a decision in the Lutheran Church case, which was rendered September 15 by a majority of the judges from the US Court of Appeals for Washington, DC. The Court decided that it would not rehear the April 1998 court order that invalidated the FCC's EEO policies.

If there is an appeal to the Supreme Court, it must be filed by December 14, 1998. The consensus is that the Court would not take the case and would allow the decision of the Court of Appeals to remain in effect. As a result, the Justice Department is apparently reluctant to authorize the appeal.

Three of the five FCC commissioners have publicly expressed their disappointment with the Court's decision and have indicated that they will work toward developing new EEO rules for broadcasters.

EAS "red envelopes" discontinued

The Commission has announced it will no longer distribute Emergency Alert System (EAS) authenticator lists, and the use of such lists will not be required in the future. The lists, commonly referred to as the "red envelopes," have been in use since the former Emergency Broadcast System (EBS) began in 1963. Now, with the concurrence of the Federal Emergency Management Agency (FEMA) and the White House Communications Agency (WHCA), the Commission has concluded that the lists are no longer necessary.

The Commission based its conclusion on the technical capabilities of the new EAS equipment broadcasters and cable operators were required to install. Specifically, when the Commission decided to replace EBS with EAS, it required licensees to acquire new equipment that can operate in an automatic mode. Since human intervention and authentication are no longer necessary to activate the system, the Commission felt that the requirement for authenticator lists had become superfluous. The Commission sought comment from FEMA and WHCA; both agencies recommended that the use of the lists be discontinued.

Commission offices to relocate

After years of bitter controversy over a General Services Administration (GSA) plan to relocate the FCC's offices across town, the FCC is about to commence with the move. The relocation will take place in phases, with the first group of employees set to move in late October. The Mass Media Bureau is expected to move in December and January.

The controversy has been over the location chosen by GSA — a new office complex, known as the Portals, located in an isolated portion of Washington, far from downtown office areas, engineers, law firms and trade associations. The location, layout and security arrangements at the new building will make it more difficult for engineers and attorneys to meet with FCC staff, monitor and expedite applications and other filings, and research FCC files. The FCC staff will be more insulated from the public at the new buildings and will be available only by prearranged consent, which will make it difficult to informally discuss pending applications and filings. Further, the limited number of routes to the new building are jammed with heavy traffic in the late afternoon, when documents typically are filed at the FCC.

Though the FCC has worked hard to minimize the effect of the relocation, the move is sure to cause processing delays, computer and file glitches, and periods when certain types of information are not available.

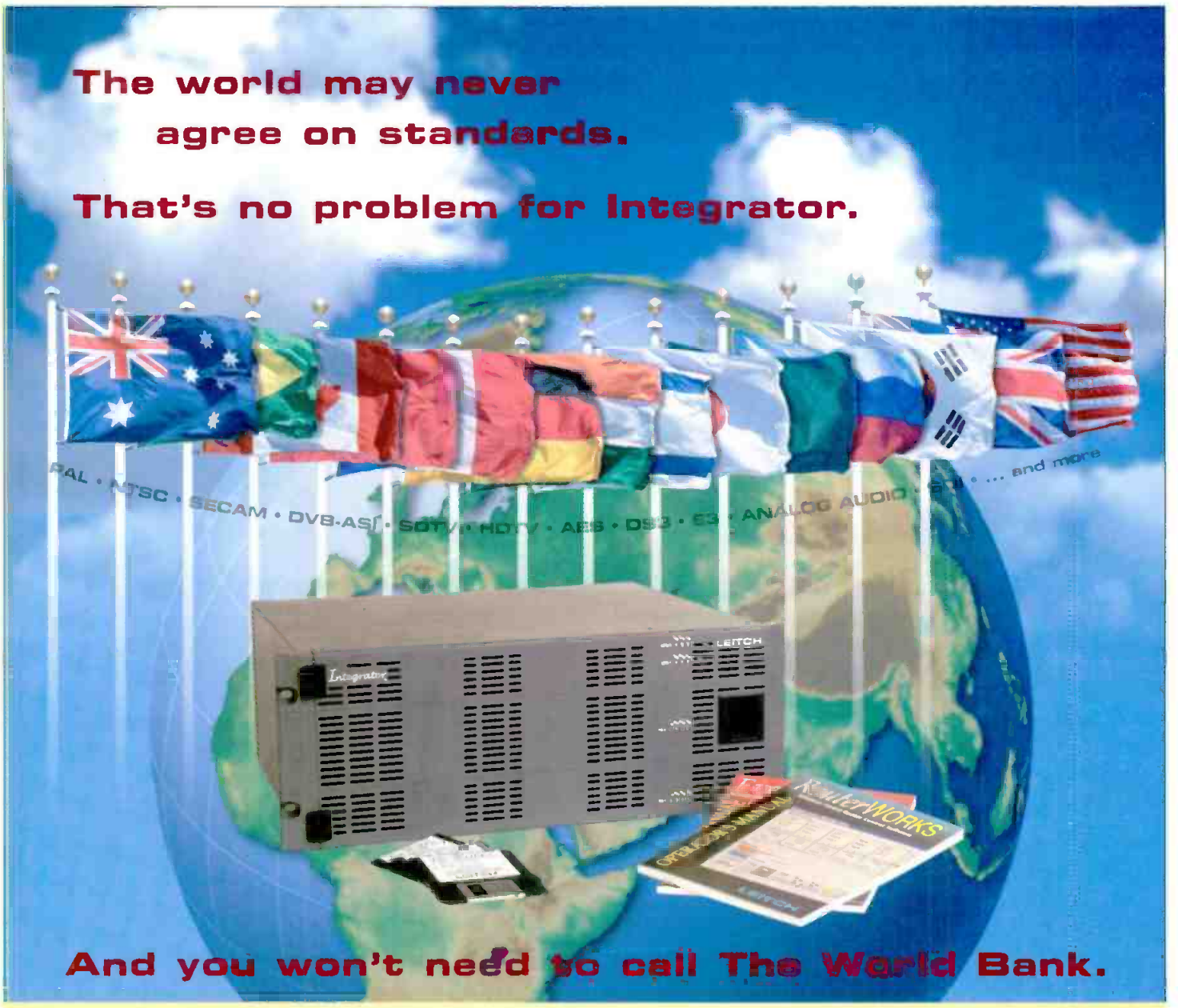
The first phase of the relocation will involve mainly administrative staff, the Office of the Managing Director and the Office of Public Affairs. The first phase will also include the FCC's auction site and the Office of the Secretary, where all FCC filings are made. The second phase will involve the General Counsel's Office, the Office of Legislative Affairs and the administrative law judges. Phases three through six will include the FCC's bureaus in the following order: Mass Media Bureau and Cable Services Bureau, Wireless Telecommunications Bureau, Compliance & Information Bureau, Common Carrier Bureau, and the International Bureau. In addition, phase six will include the Office of Engineering & Technology. ■

Dateline

TV stations, LPTVs and TV translators in the following states must file renewal applications by December 1: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. For LPTV only: Minnesota and North Dakota.

Ownership reports for commercial stations in the following states also are due December 1: CT, ME, MA, NH, RI, VT, AL, GA, CO, MN, MT, ND and SD.

Harry C. Martin is an attorney with Fletcher, Heald & Hildreth, P.L.C., Arlington, VA.



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DTV Update

Cable's STB dilemma

BY LOUIS LIBIN

The cable industry finally seems to be paying attention to the consumer. The MSOs are just now developing the infrastructure needed to support new digital features, offered by set-top box (STB) technology, including the head-end upgrades that have been promised for many years. Though STBs are expensive now, they will reach low price points quickly because they will have diverse, yet related, customer bases. Aside from the cable business, these new boxes are extremely attractive and well-suited for Internet service providers and telephone companies. Even gas and electric companies are getting into the cable business. All of these factors will help lower the price of an STB.

Though functionality is important, cost is the key. The initial focus of set-tops was to receive, decompress and display video. Now Internet access and user programming are extremely important issues. Even though 250-to 500-channel navigation and programming are critical, it's the additional features that many cable systems are focusing on.

Future STBs will be a combination cable-channel tuner and network computer, as well as a gaming device and even a full telephone device.

The set-top box will become more than a means to change channels; it will be an integral portion of a network system, capable of full home-theater applications and interactivity. Conditional access and encryption will all be standard.

The cable business

All predictions point to a large growth in the cable business, partially spurred on by the new technologies to the home. Broadcasting, on the other hand, is unlikely to escape the downturn of recent years, and the introduction of DTV in its many forms will probably not change these trends.

Cable content is an important DTV issue. In some cases, systems are fully loaded. There is physically no space to put the digital signals. These are infrastructure problems that have to be fully developed and solved. There are still unresolved issues surrounding the Federal Communications Commission's "must-carry" rules, which require cable operators to carry the feeds of local stations. Late in August the FCC extended the deadline for comments from the cable industry about the must-carry rules. The cable companies have said that there's no way to squeeze wide bandwidth high-definition content (or multichannel broadcasts) through their totally loaded cables, a position that will go against FCC must-carry regulations once local broadcasters begin to offer digital signals. ■

Louis Libin is a broadcast/FCC consultant based in New York.

Expert's Corner/Vendor Views

Build for HD — or wait?

This month's question comes from an engineer wanting advice in building a small-market TV facility.

I'm preparing to build a small broadcast facility. I'd like to be prepared for the day when the shows I produce and feed to others need to be in HD format. If I equip my facility today with DTV gear, will I need to spend less when it comes time to begin HDTV broadcasts? What are the tradeoffs between switching from an analog facility to HDTV and switching from a DTV-equipped facility to HDTV?

Vendor

Stan Moote, Vice President, Business Development, Leitch Technology.*

Because prices for DTV equipment have fallen during the last couple of years as the demand for 601 products has increased, choosing the digital route is not that much more expensive than building a new analog plant. In fact, the cost of test gear and routine maintenance is much less for digital than for analog video. Cable for DTV, for example, is about 30% cheaper than precision analog cable. And any premium you might still have to pay for DTV is worth the investment.

Let's look at what ITU-R 601 can do. First, it's component, so we can dispense with the annoying NTSC cross-color problems. The pictures look a lot cleaner than they do with composite video. Second, it's digital, and once you are in the digital domain, you won't have to worry about maintaining quality. And your staff can become familiar with digital technologies needed for the HDTV future rather than having to worry about analog problems. Third, your signal will be compatible with DVEs, still- stores and video servers without quality loss as the signal passes through A/D and D/A converters. Fourth, you can compress your digital signal for archiving and transmission over satellite, telephone lines or STLs. And here's the big plus: You can multiplex up to four 601 programs into a single 6MHz band. Fifth, you can adopt a 16:9 format whenever you are ready. This will give you the wide-screen pictures HDTV

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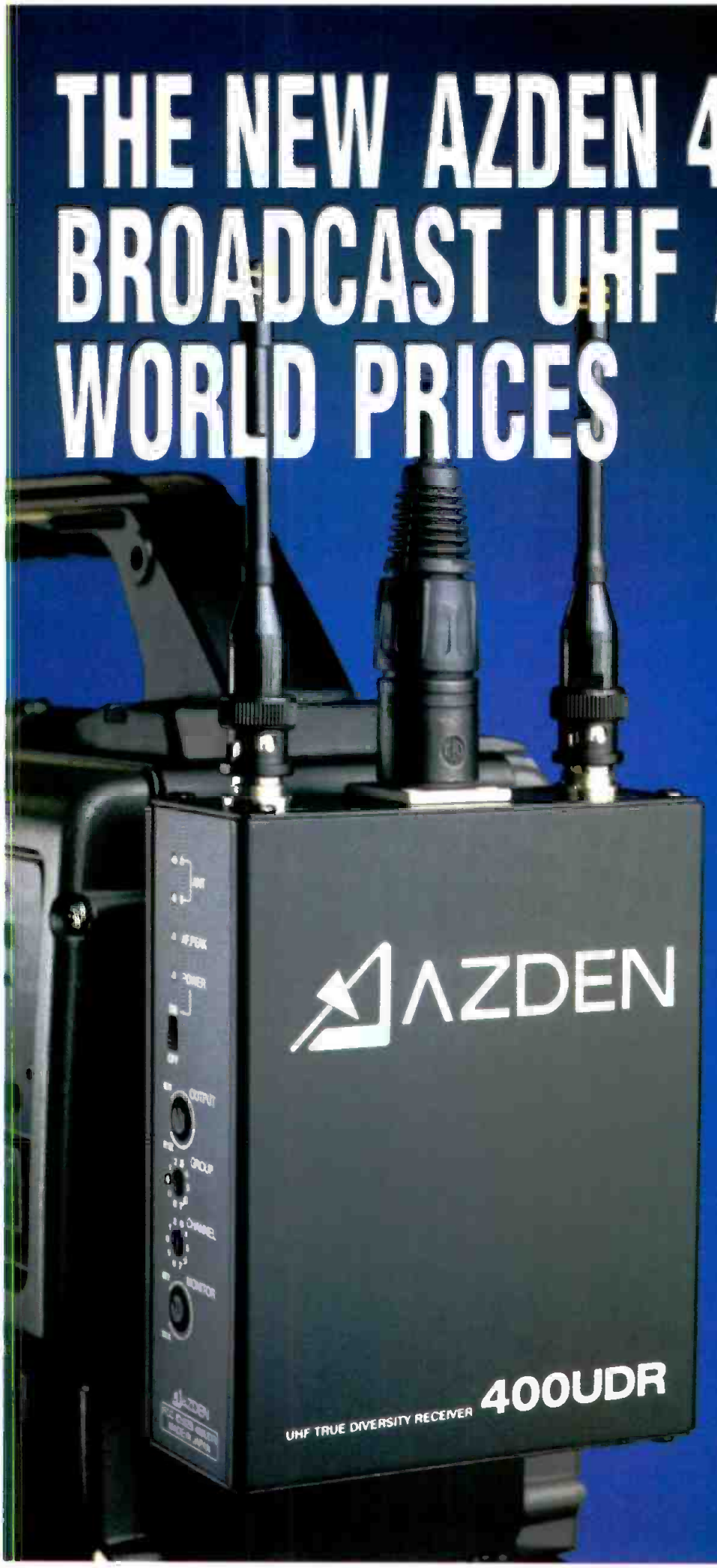

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formats require. Finally, 270Mb/s is the data rate of not only the standard serial digital interface 601 format but also the new serial data transport interface (SDTI). This data rate can be used today to transfer compressed SDTV at four times real speed or, in the future, as the in-plant mezzanine-level compressed HDTV format.

Vendor

So how would you convert later to HDTV? For a start, 270Mb/s is already the required bit rate for 480p/30, the format of choice for the Fox network. But, to illustrate how you can convert 525-line SDI to 1080i or 720p, you really need to see the output from a high-quality motion adaptive upconverter. The results of a device like the Leitch Juno, which outputs HDTV complying with most of the ATSC standards, are stunning. Not only does the new picture contain more lines, but also movement present in the original 525 lines is mathematically interpolated before being added to the new lines. The aspect ratio is also converted from 4:3 to 16:9 by the upconverter. To achieve these impressive results, you must start with a clean component digital feed. Composite analog simply isn't good enough.

Most of the 601 equipment you buy today will still be used five to 10 years from now for news events and for airing archived 525-line material. This equipment can coexist alongside the HDTV equipment you purchase as the consumer demand for high-definition movies and sports events follows the rollout of cost-effective home-theater sets. ■

**Stan Moote is also President, Leitch Technology International.*

Expert

John Aalto, Vice President, National TeleConsultants.

It is hard to imagine building a broadcast TV facility today using much analog technology, but here's why one might want to do so. Depending on inputs, outputs and quality expectations, an analog TV system can still cost significantly less than an equivalent all-digital system. For example, if your method of delivery to stations will be composite analog for the next three to four years, you might look at a low-cost, primarily analog plant as a throwaway. This would allow you to purchase the newest generation of SD/HDTV component digital equipment in three years for your cutover. You would get a higher price/performance ratio on most equipment by delaying your digital investment. The analog system would have limited value in the SD/HD world because of the noticeably inferior image that results from converting composite analog to component digital formats, either SD or (especially) HD. Here's a tip: Make sure your boss knows about your three-year replacement plan.

On the other hand, if you were to build a complete SD component digital facility with 16:9 capability today, your capital costs could be significantly higher, but you could use essentially all of the equipment to provide HD capability (with an upconverter) at relatively low cost in the future. In addition, your 360Mb router can be used for mezzanine and SDTI routing of video and data in a future system.

When considering alternatives, don't forget to weigh the impact of your viewers' response to the quality of pictures and sound, your business plan (including capital budgets, if already proposed), cash-flow expectations and the time-value of money. Other factors include projected staffing skills and numbers, signal format compatibility with your suppliers and customers, transmission and conversion costs, physical space requirements and costs, physical expansion space, maintenance costs, and media/storage costs. Being prepared for the day when you feed HD signals to your customers is best considered within a broad business and technical context. Answers to these questions will help establish a context for your conversion to HD and will ensure better decision-making.

Will you spend less converting to HD if you equip your facility with digital equipment today? The bottom line: probably. What are the tradeoffs between the options proposed? Time, quality and money. ■

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Transition to Digital

Grounding considerations for analog and digital facilities

BY MICHAEL ROBIN

In well-planned analog TV facilities, the following ground systems coexist:

- The technical ground
- Other building ground systems (structural, mechanical and electrical)
- The power neutral system

To ensure minimal interference of power frequencies into video and audio signals, all TV and broadcast equipment must be carefully grounded to a technical ground system, and there must be only a single interconnection point between the technical ground and the power neutral. In well-planned installations, equipment racks are insulated from the concrete floor: They are mounted on wood plinths to ensure the technical ground is maintained up to the point of interconnection. When this is achieved, an *isolated* technical ground is said to exist.

The purpose of keeping the ground systems and power neutral separate, except for a single contact point, is to minimize crosscurrents and inductive ground-loop pickup, which are coupled into audio and video signals and thus reduce signal quality. The waveform coupled into the signals is manifested as noise. The waveform has a fundamental frequency of 60Hz but is highly distorted and rich in harmonics. The noise it couples into the signal circuits is known as *hum*.

Hum induction

Professional-quality coaxial cables used for video signal distribution, such as Belden 8281, feature two layers of braided shields. These shields are effective at medium and high frequencies but have low efficiency at the power-line frequency and its harmonics. Consequently, high-intensity, 60Hz electromagnetic fields induce currents in the coaxial cable's shield and center conductor.

Typical North American power-line distribution uses a two-phase 240V (nominal) source balanced with respect to ground (see Figure 1). Low-power equipment uses a 120V (nominal) supply, which can be obtained between one of the active conductors and ground (AC neutral). Because balanced power lines do not induce electrical current into conductors placed in their vicinity, the two 120V feeds sharing a common neutral conductor need to be balanced. This minimizes the generation of external fields. To further reduce hum induction, all AC wiring should be run in electrically grounded (to the building mechanical ground) conduits of ferromagnetic material away from signal-carrying circuits. All signal-carrying circuits should be run in metal troughs connected to the building mechanical ground.

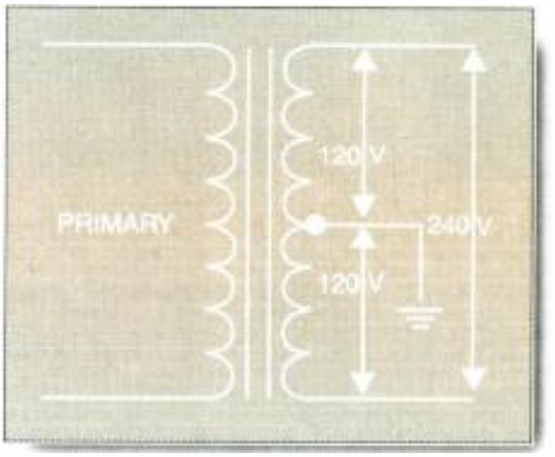
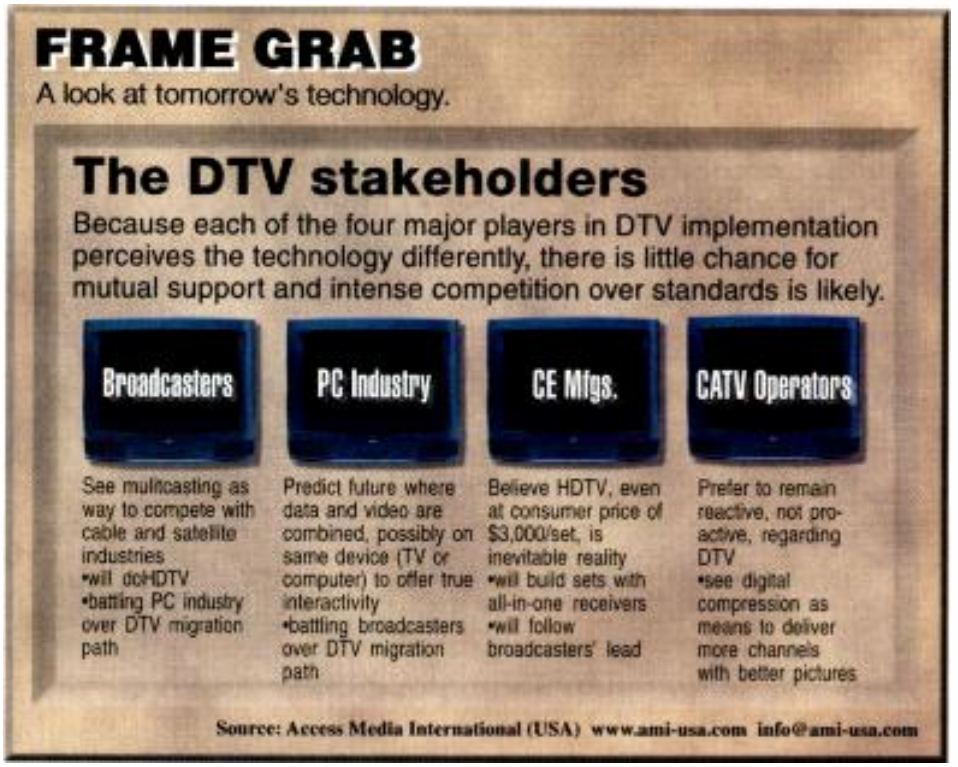


Figure 1. The typical two-phase power distribution commonly used in North America.



Ground-loop problems

Professional production equipment is usually encased in metal enclosures for mechanical rigidity and electrical shielding. The electrical ground of the circuit is connected to the enclosure. These enclosures are mechanically and electrically connected to a metallic frame housing (e.g., rack and console)

that is part of the technical ground. The various technical grounds are connected and returned to the power main ground along with the AC neutral circuits. The technical ground circuits need to be kept isolatedfrom all other grounds up to the common connection to the power main ground. Figure 2 shows a typical configuration.

With typical pieces of equipment, the power supply is the source of AC leakage currents to ground (see Figure 3). *CL* is the stray capacitance between the power transformer primary winding and the metal frame, typically 1000pF; *RL* is the leakage resistance between the power transformer primary winding and the metal frame, typically 1MΩ. The combined impedance of CL and RL in parallel at 60Hz is typically 726kΩ, resulting in a typical AC leakage to ground of 0.46mA. Assuming a 1Ω resistance between the equipment frame and ground, the leakage current will generate a 60Hz *common mode* 0.46mV (p-p) hum signal. Common mode means that the 60Hz leakage voltage is common to the shield and the inner conductor. A rack containing 20 such elements will result in an IL of 9.2mA and 9.2mV (p-p) of common-mode hum. A group of 10 racks could result in 92mV (p-p) of common-mode hum.

Many professional video distribution amplifiers feature differential inputs. These units connect the coaxial cable shield to the negative input port and the center conductor to the positive input port of a differential amplifier. The negative port features a 0.1μF bypass capacitor to ground. This type of amplifier input cancels common-mode signals at frequencies where the reactance of the 0.1μF bypass capacitor is insignificant (e.g., 60Hz).

If the coaxial cable shield is connected to ground at both ends — and if the 60Hz leakage voltages are unequal — a ground-loop current is generated. In this case, the receiving-end inner conductor has a hum voltage superimposed on the video signal. Hum cancellation cannot occur because the negative input port of the differential amplifier is grounded rather than floating.

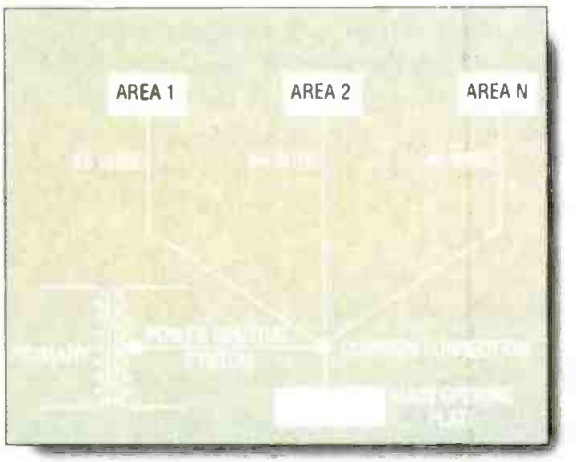


Figure 2. To minimize common ground paths, the technical grounds from various areas are connected with the power neutral system near the main ground plate.

There are several methods for correcting these problems. Use video distribution amplifiers with floating differential inputs and make sure that the coaxial shields, at the receiving end, are insulared from ground all the way to the floating differential input. If, for operational convenience, normalling jacks are provided at the input of the distribution amplifier, they must be insulated from the mounting panel, or an isolating panel must be used. Occasionally

the hum voltage, with respect to ground, of the internal conductor and the shield are not of the same magnitude. In these cases, readjust the amplifier's common-mode rejection or balance control for minimal hum.

Another solution is to use video distribution amplifiers with clamping circuitry at the input.

In cases where the common-mode hum exceeds the cancelling capabilities of the differential input and the clamp, use fiber-optic equipment.

Professional audio equipment uses floating and balanced I/Os and a balanced, twisted and shielded signal-carrying cable. This results in common-mode cancellation of induced 60Hz interference. Some audio amplifiers feature trimming adjustments of the common-mode rejection, catering to situations where the induced hum is unequal in the two conductors. A common rule is to ground the shield at the receiving end and leave it floating at the sending end. To avoid RF signal pickup a 0.1µF capacitor is connected between the shield and chassis at the sending end.

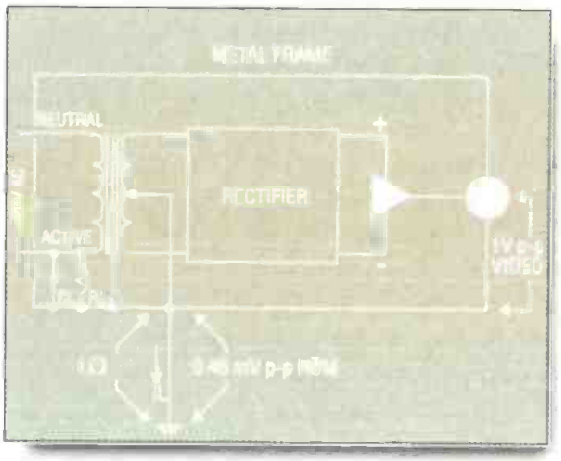


Figure 3. Simplified diagram of AC leakage hum generation within a typical power supply.

Considerations for digital systems

Digital systems are insensitive to the 60Hz power-line interference problems analog equipment encounters. However, a major problem with digital equipment is the generation of electromagnetic interference (EMI), which can adversely affect nearby analog equipment. Large-capacity video routing switchers operating at 270Mb/s can generate high levels of EMI. To reduce EMI, the equipment is typically enclosed in an RF (Faraday) cage, and all input and output cable shields are grounded solidly to the metal frame at the sending and receiving ends of the signal cables. This practice conflicts with analog requirements.

The AES/EBU digital audio distribution concept allows for two digital audio signals to be time-division multiplexed into a biphase mark encoded serial digital datastream. Users have the choice of using shielded twisted-pair (STP) cables or 75Ω coaxial cables for equipment interconnection. Audio studios tend to prefer the STP approach, while TV studios prefer the coaxial approach. One problem system designers encounter is the presence of both types of equipment in a studio, which complicates equipment interconnection (for more on this topic, see October's Dr. Digital column, "Twisted -pair or coax?," p. 50).

Figure 4 shows the AES3-1992 standard recommended equipment interconnect using STP cables. Figure 4 also shows the AES3id-1996 standard suggested equipment interconnect using coaxial cables. In both cases the shield is grounded at the signal source and is

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Figure 4. Digital audio interconnection is accomplished using either a) shielded twisted-pair or b) 75Ω coaxial cable.

floating at the destination for low frequencies, but the high frequencies are bypassed to ground by the 0.1µF capacitor. This practice helps avoid low-frequency ground loops.

In analog systems, adequate grounding practices can help prevent hum problems. However, once a ground loop is encountered, eliminating its ensuing effects can be difficult. In digital systems, inadequate grounding schemes give rise to EMI problems, which can become a nuisance in large systems. These problems can be prevented by observing the suggested planning and installation rules. ■

Michael Robin, former engineer with the Canadian Broadcasting Corporation engineering headquarters, is an independent broadcast consultant in Montreal, Canada. He is the co-author of Digital Television Fundamentals, *published by McGraw-Hill.*

The following rules of thumb apply for digital systems:

- Ground all input and output cable shields directly to the metal chassis.
- Seal equipment enclosures. If doors are provided for interior access, the design must ensure that, when closed, the doors are reliably grounded either by using flexible "finger"-type brass plates or a heavy braided conductor connecting the door to the main chassis.
- It is preferable to not mix analog and digital functions in the same enclosure. This applies specifically to routing switchers.
- The metal enclosure or rack must be connected to the main ground through a heavy-duty braided conductor. Conventional single-wire grounding conductors may resonate at 270MHz and radiate EMI.

Michael Robin's book may be ordered directly from the publisher by calling 800-262-4729. It is also available from several booksellers.

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Troubleshooting Ethernet networking

BY BRAD GILMER

Sooner or later, you will have a problem with your computer network. This month's article gives you some pointers on finding and fixing network problems.

Network problems come in three flavors: software problems that usually accompany the installation of a new network interface card (NIC), hardware failures such as broken cables and failed power supplies, and soft failures that can reduce network performance to a crawl. Of the three, the last is usually the most challenging.

Plug and play, or plug and pray?

Lets start with configuration problems. Operating system providers and NIC manufacturers have come a long way toward simplifying the installation process. If you are having problems installing network cards with pre-Windows95 operating systems, consider upgrading to either Windows95 or Windows98. While plug-and-play peripheral installation still has a way to go, it is a great advance over earlier Intel-platform operating systems. Be sure you have the latest drivers from the manufacturer. This should be your first step in any network installation.

The Microtest MicroScanner is one of a variety of low-cost network testers.

Most network cards are shipped with a diagnostic utility which verifies that the computer can recognize and communicate with the card. Though successful tests may not mean you can communicate with your network, they do mean that the card is installed, is receiving power, and is able to receive commands and respond appropriately. You should also read the manual and help files included with the NIC. These usually include a number of hints that may solve network problems.

If the software appears to be working properly but the computer is still unable to establish a connection, there may be a problem with the physical link to the network. One of the most useful troubleshooting tools is the NIC LED. Concentrators and Ethernet switches have similar diagnostic LEDs.

The LED conveys two important pieces of information. First, it will light steadily to indicate link integrity. This means that: 1) the card is installed properly, 2) software drivers are loaded and have established communications with the card, and 3) the drivers on the card have recognized a hub, switch or other Ethernet device at the other end of the cable. This does not necessarily mean that you can establish communications with a computer or server on your network, and it may not mean that your cabling is in perfect condition. Second, the LED will flash to indicate that there is activity on the network.

If the LED on the NIC is operating correctly but you are still unable to establish a connection, break out the diagnostic diskette provided with your NIC card.

If you have run the diagnostic routines and things still do not work correctly, what next? It is possible for a NIC LED to indicate proper operation even though the NIC is still be unable to communicate. As examples, the cable may have very poor frequency response, or may

Datastorms

Datastorms are caused by a computer on the network chattering endlessly, creating a storm of communications that keeps everyone else from talking. Under normal circumstances, computers talk over a network using a set of prescribed rules that allow everyone a chance to use the network. In Ethernet networks, this is accomplished using a collision and backoff system. Everyone is connected to one big party line. If the line is quiet, a computer may begin communications. If the line is busy, the computer politely waits its turn. If two computers talk simultaneously, both of them recognize the collision, stop transmitting and, after a random period of time, try again.

Datastorms are caused by network interface cards (NICs) that do not to play by the rules. Instead of recognizing other communications and waiting their turn, these NICs emit a continuous stream of data. As a result, other computers on the network wait patiently (forever) before trying to communicate, causing the entire network segment to come to a grinding halt.

Datastorms are rare, so recognizing one can be a challenge. Once you have determined you have a datastorm, begin disconnecting computers until you identify the culprit. If you have a large system, a network sniffer can be invaluable in isolating and repairing this problem.

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be improperly terminated, causing numerous reflections. The next stop might be to obtain a LAN cable tester.

Test the physical link

LAN cable testers are available in a wide range of prices and functionality. Some of the low-end products provide nothing more than the NIC diagnostic LEDs in a hand-held package. Others report a variety of parameters.

The Microtest MCT-8200 Microscanner is an example of a relatively low-cost LAN cable tester. It verifies that a cable is wired correctly and tests for opens, shorts, reversed or crossed pairs and split pairs. It also provides overall cable length using time domain reflectometry, and it lets you know if the cable is connected to a hub. Finally, it provides cable tracing, allowing you to follow the path of a cable through walls, floors and ceilings, and helps you identify an unlabeled cable in a wiring closet.

The next step up includes products such as the NetCat 1500 and the Fluke 652. Besides providing the functions listed above, these testers verify that your installation meets Category 5 wiring specifications by measuring background noise, attenuation, distance to failure, and termination impedance. These products also can be connected to a PC to provide logging of traffic on the network.

The equipment listed above will help you locate the most common network faults, such as broken cables, improper terminations and wiring errors. If everything tests out okay on your network, but you still have communications problems, or if your problems are highly intermittent or seem to be protocol related, you may need a LAN sniffer.

Track down the problem

LAN sniffers connect to the LAN and provide details at a very low level. The sniffer allows you to identify problems such as a broken NIC card causing a datastorm (see related story, "Datastorms," p. 42), or an improperly operating router.

NetXRay by Network General is an example of a PC-based sniffer product. It provides analysis of over 100 protocols, including IEEE 802.3, IP, HTTP, LAT, AppleTalk, NetBIOS and Telnet. Through real-time monitoring, logging and analysis, it can provide detailed information about who is talking to whom, what protocols are in use, which IP applications are running and which IPX transport processes are being used.

If your network problem is particularly difficult, you may need to hire someone trained in interpreting the results of a sniffer test, since the output of the device may not be obvious. However, if you are familiar with network protocols or you have a desire to get a better understanding of what is really going on in your network, sniffers are excellent tools.

The most common network problem is an improper cable termination. Another common cause of network problems is using improper network components such as non-Cat-5 cable or telco punch blocks. These items may not cause problems initially, but may contribute to network problems as your network grows in size. ■

Brad Gilmer is President of Gilmer & Associates, a technology and management consulting firm. (770) 414-9952

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Protecting videotapes

BY STEVE EPSTEIN

I need to spray a room full of videotapes with a pesticide, Vikane (sulfuryl fluoride), from Dow AgroChemicals. Dow tells me it is safe, but the package warns against using the chemical in the presence of plastic. Will this harm these tapes?

Larry Cooper
San Jose, CA

Good question. I am not a chemist, so I turned this one over to the tape manufacturers. Despite plenty of time and several calls, only two of them responded. The first was Maxell:

Pertaining to Vikane (sulfuryl fluoride):

Maxell has not tested Vikane (sulfuryl fluoride) on any magnetic or information storage media. Upon contacting Dow Chemical, AgroSciences Division, we were informed that Vikane is used in many museums, including the Smithsonian Institution, and is considered extremely safe for use where artifacts and museum specimens are kept.

Further, when used in the proper prescribed manner, Dow maintains that Vikane will not react with any of the components used in the manufacture of magnetic tape.

Caution: In any data/tape library, especially an archive, an unexpected reaction could occur when Vikane is used. It can dissolve in water and other liquids (including organic solvents), and the vapors could trigger some reaction. Dow does acknowledge that Vikane, in liquid form, will react with metals, but the company does not specify what metals.

Any potential user should contact Dow AgroSciences at 800-258-3033 before using Vikane.

George McBride
Maxell Corporation of America

Larry, isn't that where you started? I also received a response from Sony Recording Media's Dolthan, AL, manufacturing facility:

Sony does not recommend that any recording media (nor media cases) be exposed to any unnaturally occurring chemical vapors. The recording media is basically a polyester base film with a layer of special polyurethane paint comprising the recording layer. The cassette housings and cases are composed of ABS (acrylonitrite butadiene styrene), HIPS (high-impact polystyrene) and other plastics. I would also be concerned about corrosion in the metal parts of the cassettes.

The vapor can cause immediate and/or long-term damage to the media and cases, and any residual chemicals may be transferred into the VTR and cause damage or tape failure there.

Our recommendation for storage and use of recording media is 70° F (± 5°) at 45% relative humidity (± 10 %) with normal atmospheric conditions.

Steve Tice, General Manager
Quality Management Division
Sony Magnetic Products of America

It seems to me that using any chemical in an area where tapes are stored is not a good idea. When digging into this problem, I discovered an instance where tapes were shipped into Australia and stored in a warehouse for only a short period of time. Because of customs regulations, the place was fumigated regularly, but generally not while the tapes were in it. However, residual amounts of the chemical ended up on the tapes. This chemical later reacted with lead in the heads of Studer machines, and the resulting corrosive effects destroyed both the tapes and the heads. The problem did not show up on other manufacturers' machines, because the head chemistry was slightly different.

If you need help, contact me a at drdigital@compuserve.com. ■

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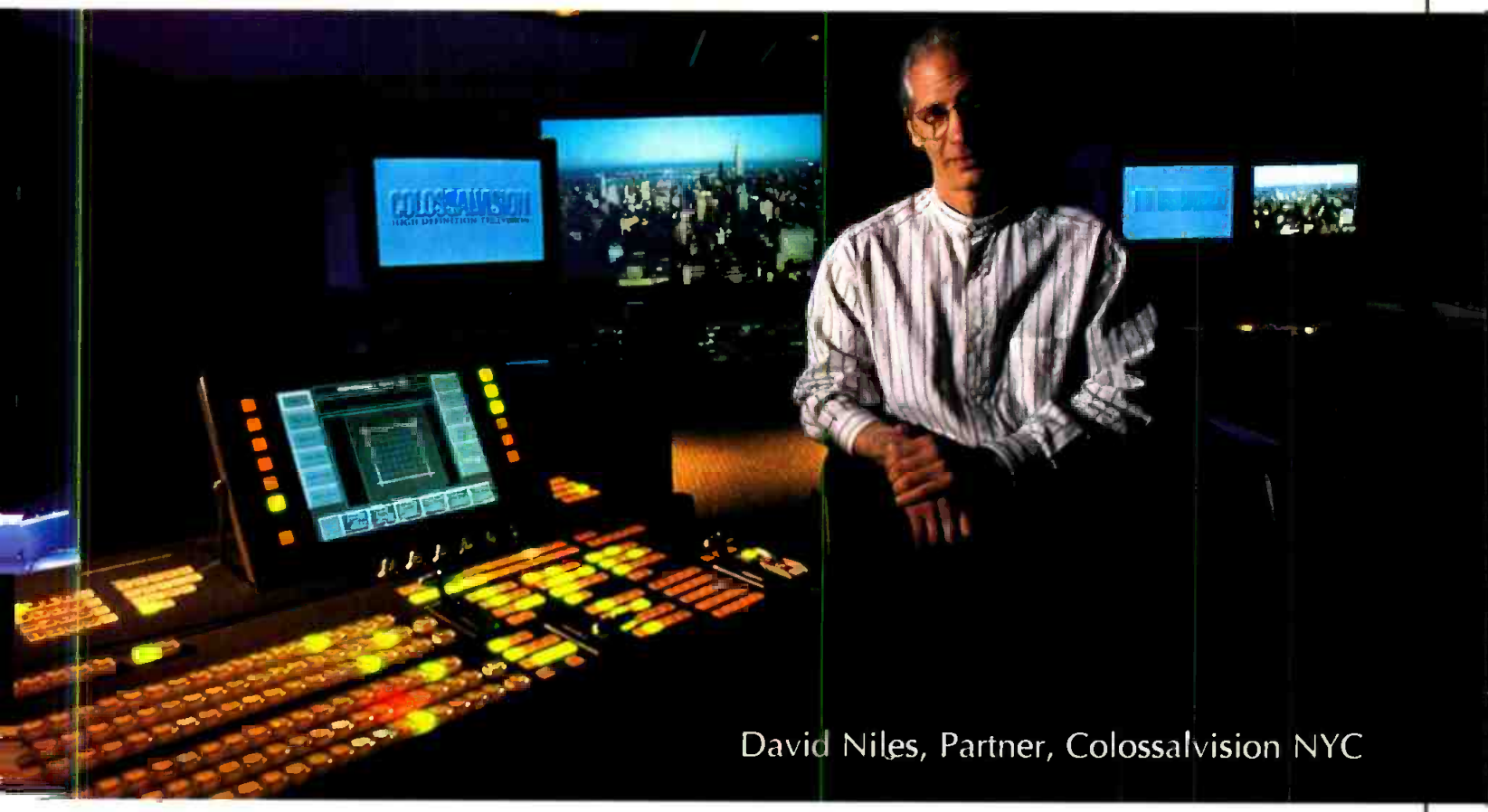

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Transmission & Distribution

The DTV update

BY DON MARKLEY

There are two significant items of interest to prospective DTV operators. These include a recent field test and additional information from the FCC on filing applications for either allotted or expanded DTV stations.

Chicago field-test results

A report on a recent, significant field test was published in the *IEEE Transactions On Broadcasting*. The report, titled "Tribune/WGN DTV Field Test," contains the results of extensive measurements performed by Tribune Broadcasting and Zenith Electronics Corporation. The tests were performed to determine the feasibility of transmitting a DTV signal from a site in a dense urban environment that included numerous tall buildings. Among the various professional naysayers who continue to predict the inability of DTV to work, there has been the argument that the DTV transmitting antenna would have to be totally clear of all obstacles to avoid multipath signals. This test has greatly reduced the possible validity of that argument.

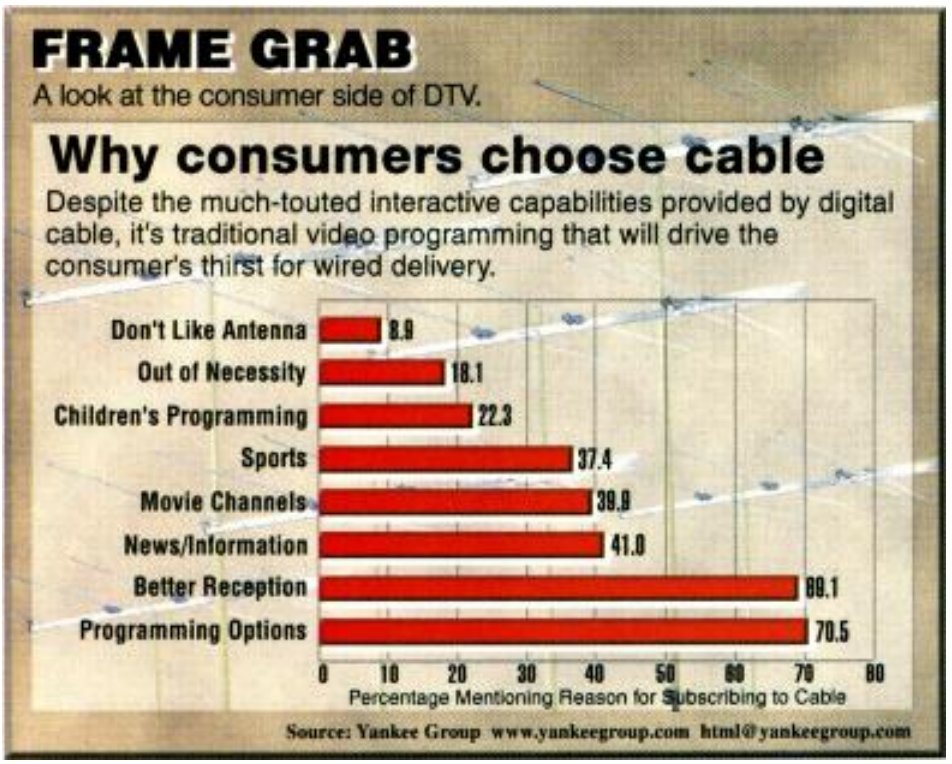
The test was performed on Channel 20, which is used by WYCC-TV and licensed to Chicago City Colleges. The antenna is located on the Hancock Building in downtown Chicago. Harris Corporation assisted in installing a DTV exciter in the WYCC-TV transmitter that allowed switching between normal NTSC operation on Channel 20 and DTV operation using one of the klystrons. The only other change to the transmitter was to disable the pulser circuits. Both DTV and NTSC signals were measured at each point.

The complete report is available from IEEE. To quote from the report summary: "The DTV field test in Chicago demonstrated that digital transmission from a large structure in the heart (downtown) of a large metropolitan area is not only possible, but can be quite successful over a large area." The report showed that DTV signals would be highly usable anywhere NTSC signals from the same facility are good. Further, the DTV signals were acceptable in areas of less-than-perfect NTSC signals. The only places where the test found problems with DTV were in the "concrete canyons" of the downtown area, where the NTSC signals are also terrible. Points significantly distant from the transmitter site were all good with respect to DTV signals out to a maximum distance of 55 miles. The tests also indicated that the use of indoor antennas is highly possible, although the placement of the antenna system is critical. The report is highly recommended reading for urban DTV operators.

Additional application guidelines

The FCC has published a public notice titled "Additional Application Processing Guidelines For Digital Television (DTV)." Available from the Commission's web site, this notice details the requirements for filing applications that do not simply propose the allotted DTV facility. An earlier notice discussed the "checklist" applications. Those are the applications that propose either the allotted facilities or something with less coverage. The name for that group of applications comes from the small checklist at the beginning of the DTV application for construction permit. If an applicant can check "yes" to all questions, the CP will be granted quickly, and no additional studies will be necessary. The problem is that many, if not most, stations will want to modify the allotment facilities by changing power, site or antenna pattern. It is that problem which is addressed in the public notice.

Changes in NTSC stations will not be permitted if they cause any increase in interference to any allotted DTV facilities. There are no *de minimis* criteria in



these cases, although the interference can be rounded in accordance with the procedures contained in the notice. The percentage of the population receiving new interference is to be rounded to the nearest tenth of a percent. Therefore, if the increase is 0.049% or less of the population, the rounding would show no interference to exist.

For DTV stations, the method for calculating interference is defined in detail. Readers are referred to the notice, since the information is lengthy. Basically, the interference caused to another DTV station cannot be increased by more than 2%. No station can be caused to receive interference to more than 10% of the population within its noise-limited contour. Therefore, if a station already receives interference to 9.2% of its service area, the increase is limited to 0.8%.

Now for the fun part

The study to determine the amount of new interference must be performed using the method contained in OET Bulletin 69, which is also available from the Commission's web site. This is an extremely complex calculation that makes use of a 3-second terrain database and the Commission's databases for both NTSC and DTV stations. Unless you're a computer guru, don't even think about trying to write your own version of the software. The program, which is available from the Commission, is in Fortran and runs best on something larger than a PC. Some people are running this program on a Sun workstation. These workstations are not found in most TV stations. One engineer who tried to modify the program to run on a PC ended up with run times of several hours — not a reasonable solution to the problem.

The analysis must use the Longley-Rice propagation model. That model has been around for some time and is generally believed to be accurate, although some users would prefer a different model, called TIREM. The Commission, in its reply to the petitions for reconsideration, clearly identified the Longley-Rice method as the only one it will consider acceptable. In addition, your program must be capable of determining the population in areas no larger than 2 sq. km. Smaller areas can be used, but your application must advise the Commission of that change.

Fortunately, at least two sources are available for DTV study software that will run on a PC under the Windows operating system. It is highly recommended that you have a relatively fast PC with a lot of memory. The programs print out nicely on inkjet printers and will provide the information needed for the interference study as well as coverage studies.

Programs from both EDX Engineering and V-Soft are available now. Before you leap for the phone, understand that these are major pieces of software and that their prices reflect a significant amount of work in adapting the OET program for PC use. Plan on spending about $10,000 for the programs. In addition, you will need a 3-second terrain database that will reduce your checkbook balance by another $3,000 or so. For the TV station databases, V-Soft provides the latest version for users on their web site. EDX provides the software to convert the Commission's databases to their format. In either case, the station databases are free. However, using the programs, as well as determining the compliance with the interference increase

criteria, is not a simple slam dunk. The evaluation is rigorous and will obviously be checked carefully by the Commission.

Before the letters start to arrive, let it be known that at least two other vendors are preparing DTV interference programs. The only warning is that the program used must produce essentially the same results as the Commission's program. In fact, you are required to identify the method used in your study and to explain how it was checked to agree with the Commission's method. The EDX and V-Soft programs appear to be right on the money, which is a relief after you have spent all that cash. We have not tested the others.

Overall, the good news is that a significant study supports what many of us have believed for some time: DTV will work well compared with NTSC. The bad news is that it is going to cost you if you want to do your own DTV studies. Not to blow our own industry's horn here, but you might be better off calling on your consultant. As an alternative, Dataworld is also doing DTV studies. Unless you need to do this work for several stations, you will find it much less expensive to farm out the work to an engineering firm or to Dataworld. ■

Don Markley is President of D.L. Markley and Associates, Peoria, IL.

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Audio levels and metering

BY KENNETH HUNOLD

It has been said that television without sound is a stand-by slide. While that statement may be an exaggeration, sound is an important part of the TV experience.

Audio has become ubiquitous, and everyone seems to think he's an expert on the subject. There are almost as many opinions on how to meter and monitor audio signals as there are audio engineers. Audio people criticize TV audio products for their audio omissions, while video people bemoan the multitude of standards used on the audio side of the house. At the risk of offending or contradicting engineers on either side of the continent, a few suggestions about audio levels and metering follow.

LED meters can provide highly accurate indications of audio signal parameters, such as loudness, peak, average power, VU or peak-and-hold. Analog VU-type meters cannot provide the same accuracy.

The history of standards

First, let's look at how early standards developed. Audio transmission (in broadcasting) evolved from the telephone industry. Balanced audio transmission and the 600Ω impedance were developed by the long-distance telephone industry and were often incorporated into broadcast-facility designs. Transmission-line theory was cited to require impedance matching for maximum power transmission from source to load. The unit of measure was the Watt, and audio signals were measured by comparing them with a reference power level of 1mW into 600Ω. The ratio of any power to the reference power was given in decibels. The difference between the measured power and the reference power of 1mW was assigned the unit dBm. A common operating reference level was 8dB above 1mW into 600Ω, or +8dBm.

Today, power-matched audio transmission has been replaced by a voltage-based interfaced system where source impedances are kept low. Most loads *bridge* the source rather than terminate it, and they do not draw significant power from the source. The term dBu describes this new measurement and is defined as *decibels unterminated*. To maintain some continuity with the older dBm notation, 0dBu was defined as the voltage across a 600Ω load when it is dissipating 1mW = 0.77459V (often rounded to 0.775V).

In North America and Japan, the +8dBu reference level has largely been replaced by +4dBu. Often, as facilities change from power-matched transmission to voltage-based transmission or when they convert to digital audio distribution, the reference level is simultaneously changed to +4dBu. The new level allows sufficient headroom (approximately 20dB) with popular IC devices using power supplies of ± 15V.

Metering devices and standards

Metering, both for calibration and operation (gain riding), is an area in which multiple standards coexist. The traditional method of metering/monitoring audio signals was the VU meter. Learning how to "ride" audio level is an acquired skill. It is sometimes difficult to interpret the movement of a VU meter, and instructing operators how to set program levels based on its readings can give greatly varying results. The peak program meter (PPM) was developed to offer a better indication of program loudness and to aid in more uniform loudness settings. But old ways die hard. If there is a VU meter somewhere in the room, many operators will, almost subconsciously, glance at it occasionally as a sort of reality check during a session or show.

With the proliferation of solid-state metering devices, the *ballistics*, or movements, are often not obvious and may not represent a known standard. To that end, you may have to look at the configuration of the meters and make some choices. If the meter in question has only a few segments above the *lineup level* (the level you set your reference tone to), assume that the display has VU-type ballistics. Such a meter would not let you see the peak level of the signal, but it would keep the display from maxing out on audio peaks. Conversely, if the meter has much room above the lineup level, it could be easier to see the peak levels of the program. However, electronic meters can turn on and off again too quickly. In this case, a *peak-hold* feature can be used to hold the highest level for a second or two to ensure that operators do not miss it. Some electronic meters allow the scale resolution to be increased for greater precision when setting levels. Then, after level setting is completed, the scale resolution can be reduced to allow a greater range of audio levels to be indicated.

No metering technology can guarantee proper levels under all conditions. The best solution is the intelligent interpretation of the meter display by a quality processor — the human brain. Unfortunately, even this analog computer can suffer from bad "programming." ■

Hunold is audio/video project engineer with the ABC Engineering Laboratory, New York.

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SYSTEMS DESIGN SHOWCASE

Photo: The completed CNN Newsroom. (Photos courtesy of CNN)

CNN: charting a new frontier for newsgathering

By Jerry Whitaker,
technical program consultant

Advancements in the technology of TV newsgathering have come in waves. The first wave was the mid-'70s transition from film to video cameras for acquisition. The second wave, which followed about five years later, was the blossoming of satellite relay as an efficient method of transmitting raw footage and live reports. The third wave was the mid-'80s move to efficient newsroom computing systems. The fourth wave came with the introduction, in the early '90s, of practical desktop video-editing systems.

CNN, long recognized as a leader in the application of new technologies to the newsgathering process, is now implementing what promises to be the fifth wave in the march of TV news: the integration of waves one through four. This effort is far more aggressive than it may at first appear. The network's ultimate success in this project will

The CNN newsroom before renovation began.

affect the products vendors make and newspeople use for years to come.

The CNN effort is far more than just "going digital." It promises, rather, to reshuffle the technical deck insofar as TV news is concerned.

The new newsroom

If you have tuned in to CNN lately, you will have noticed something different. A new newsroom went to air last month, the culmination of a major construction effort. However, beyond the on-air splash lies a longer-term effort to rebuild the infrastructure of CNN and its sister networks. The organization is changing the way information — text, video and audio — moves around the plant, is processed and, ultimately, is delivered to the consumer.

The project of rebuilding the CNN newsroom began in December 1997 with initial design work. The first order of business was to move the existing operations into another part of the CNN center so the old facility could be stripped from floor to ceiling. Available space on the seventh floor was converted into a temporary newsroom, and the reporters and on-air talent operations were relocated into what came to be known as "the garage." Despite the cramped space, the illusion of the original CNN news studio was recreated using large photographs of the facility taken before the reporters moved out.

Construction on the new facility began in March, and all of the basic work was completed by late August. The news-gathering functions were then moved back in, followed by the updated on-air presentation sets. On October 5, The new newsroom officially signed on.

One of the elements that complicated this already daunting project was a change in lightning from florescent to incandescent, which affected AC power loads and air-conditioning requirements. Because the facility is a working newsroom, sufficient attention must be paid to providing good lighting in the work environment.

The switch to incandescent lighting provided increased flexibility and control over lighting of the newsroom. This change facilitated tailoring lighting to each of the individual anchors. Further, the lighting in the newsroom background now includes a variety of "cues" based on what is happening in the foreground.

"The change in the workflow and the training that it requires is a bigger challenge than the change in the technology."
Gordon Castle, vice president, research and development, production, CNN

From the start, the goal of the renovation was to improve on the original CNN "look," not to develop a completely new on-air presence. This goal guided the planning, construction and graphics of the newsroom. A new presentation set was devised to accommodate interview situations and special-events coverage.

There are 67 artists working at CNN in capacities ranging from graphics to production to lighting. The goal of the team is to make every show graphically appealing and to convey a sense of continuity throughout the broadcast day. Because it is a working facility and not simply a set, the CNN newsroom is busy around the clock. To capture that feeling of activity and immediacy, the new newsroom was designed to permit 360° shooting as required.

There are a many windows at CNN center. Dealing with day/night lighting conditions, and the resulting color-temperature differences, was another important design issue. The central anchor set was designed to rotate as much as 40°, to assure a measure of lighting flexibility. Also, the outside windows are not in the primary shot at any of the usual angles.

Along the back wall, a large set of movable transparencies was installed, which depicted the Atlanta skyline during the day, at twilight and at night. These backlit, 20-foot transparencies are mounted on large, remote-control rollers that the lighting director operates. CNN has successfully used this approach to scenery change at its bureaus for some time. At the bureaus, the scenery, lighting, camera and other elements can be controlled from the Atlanta headquarters, thus minimizing on-site personnel requirements and

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maintaining the network's consistent overall look.

An steel floor, elevated 4 inches, was installed in the newsroom, and the miles of cable required were then laid in the floor and ceiling.

Besides the newsroom itself, various upgrades for control rooms A and B were made in this phase of the renovation project. In the future, rebuilding a number of the technical and control facilities is planned.

Network television — a unique beast

The real-time, no-fault nature of television imposes unique demands on personnel, systems and planning. In television, the need exists to bring a wide variety of sometimes rather vague data to the right place at the right time. This process is becoming increasingly dependent on information technology (IT) systems. However, the usual IT paradigm is often not applicable to the TV facility. This has forced CNN to reinvent the wheel on many occasions.

Non-linear editing is one area in which CNN has pushed the envelope.

The renovation of the CNN newsroom is just the beginning of a much larger story unfolding as the network prepares for the digital future. Step by step, CNN is tackling challenging technical issues as it prepares for an era in which efficiency, speed and reliability are more important than ever before.

Non-linear thinking

Non-linear editing is one area in which CNN has pushed the envelope. The move to non-linear editing systems tends, initially at least, to slow down the processes of newsgathering. Two computers will require a number of criteria before they will successfully talk to each other, whereas a guy with a cassette in his hand can leap over desks — if necessary — to move the program from one location (or machine) to another. The editing system issues center on intersystem communications and moving data through a diverse range of hardware and software. Television, unfortunately, does not lend itself to simple modeling. There is no "transactional unit" that you can follow from one point to the next and make sure its integrity is preserved, as is possible with most traditional IT applications.

Technology issues aside, perhaps the greatest requirement of a move to non-linear editing is training editors, producers and reporters to operate the systems and to realize their full capabilities.

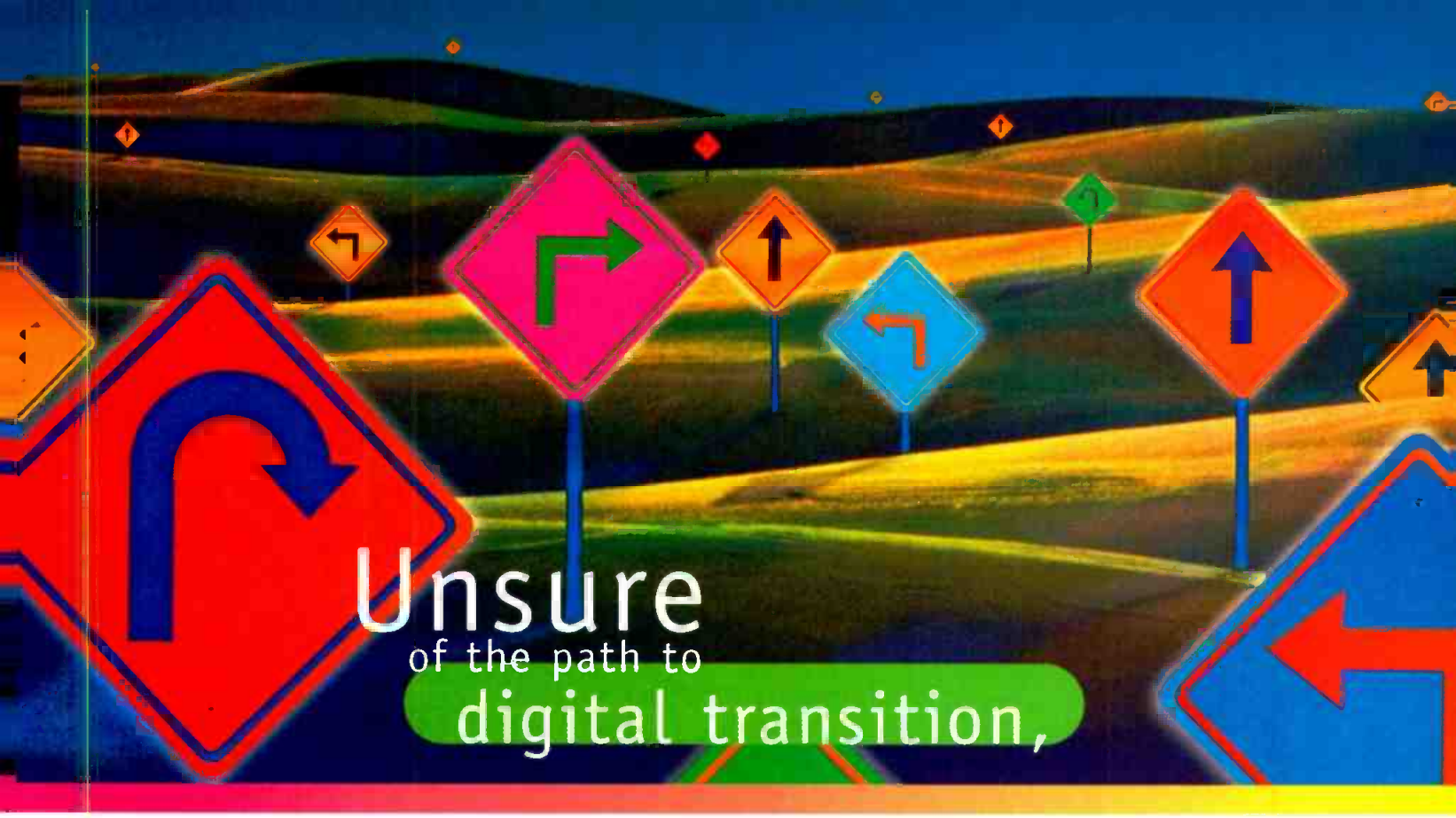
The first non-linear editing systems were installed at the CNN*fn* network about three years ago. As expected, the network encountered some growing pains during the process. Still, the NLE systems proved their value and set the groundwork for future expansion of non-linear use. Through the CNN*fn* experience, a number of "coping strategies" were developed, which subsequently became part of the system design for future implementations. CNN Headline News was next to move away from tape-based editing, benefiting from lessons learned at CNN*fn*.

The network is well underway on the first phase of a three-phase plan to displace all of the machine-to-machine, VTR-based editing with server-based systems. The first element of phase one involved, essentially, a workflow change. Phase one did not include a great deal of technology, but instead focused on changing the mindsets of people who have worked in their separate newsrooms using familiar equipment for many years. One outcome of this effort was the creation of a centralized entity called Media Operations. This organization, in a departure from the past, combined many previously separate functions in the path from feeds to editing to on-air. As part of this work, a central feeds area was organized that brings together the individual elements that had been disbursed throughout the individual networks.

There was one specific piece of technology developed for phase one: a low-resolution browsing system. The system, developed in conjunction with Silicon Graphics, Virage and Informix, will ultimately incorporate centralized management and cataloging as well as scene-change detection and logging.

Under phase one, 40 input stations (32 in the feeds area and eight in the central editing area) were established using analog tape as the storage media. Whenever the feed machines are in the record mode, the information is cap-

The CNN newsroom taken to the bare walls. As part of the rebuilding effort, an additional 1,300 square feet was added to the room.



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tured as low-resolution 1.5Mb/s MPEG files for browsing applications across the newsroom local area networks. There are four subnets, two for CNN, one for Headline News and one for CNN International. A 1.5Mb/s stream was chosen because it supports full frame rates, thus facilitating the future move to desktop editing of video.

Developing a practical system for browsing was no easy task. Off-the-shelf solutions with the capabilities to support 300 concurrent browsers did not exist. CNN engineers worked with various vendors to take the best elements of different systems and form them into a unified system that met the requirements of the network. The system relies heavily on the Internet template, with URLs generated for captured video segments.

Statistics show that 80-85% of the editing done at CNN is cuts-only — such as for sounds bites and voice-overs — which really does not require the capabilities of a non-linear editing suite. These functions can thus be efficiently handled at the reporter or producer workstation.

Under the second phase of the program, additional features such as time-code stamping and manual text logging will be implemented to provide so-called key-frame storyboards. This information will be stored as metadata on its own separate SGI server alongside the low-res video content. In this way, it will be immediately available and searchable via the low-res system. The server (to be provided by ASC) will input only the material that is cut and ready for air.

Looking further into the future, it is anticipated that full-featured editing of segments or programs will be performed from the server. That is, the material will reside on the server, not at the local editing station. The original material will not be modified. Instead, an EDL will be developed, and the segment or program will be conformed to air directly from the server.

Reinventing the newsroom computer

CNN has also embarked upon a mammoth project to upgrade more than 1,300 of its existing newsroom workstations for the newsgathering and authoring operations of CNN/US, CNN*fn*, CNN International, and Headline News. The upgrade, proceeding in a staged manner, began with the installation of AvidNews NRCS systems at Headline News during the summer. All of the existing Avid NetStation personal computer units will be replaced with the AvidNews NRCS over a two-year transition period, both at CNN headquarters and its bureaus.

Asset-management effort

If there is a phrase that ties all of the foregoing efforts together, it is *asset management*. The CNN digital asset-management plan involves an open framework that supports a laundry list of video functions, including the following: acquisition, creation, manipulation, storage, archival, retrieval, transmission and display. For a video facility, digital asset-management applications can be divided into the following general categories: *asset acquisition* (applications that log content into the digital asset management system), *asset distribution* (applications that deliver and display multimedia content) and *content creation* (applications that generate digital content). Such an asset-management program far outstrips the conventional video approach to saving, logging and reusing video.

The promise of digital archiving provides a wide range of benefits for CNN, from more efficient sharing of video clips to reduced floor-space requirements for material storage. Another consideration is the typical shelf life of videotape. Unlike books, which can have a shelf life of 150 years, videotape has a shelf life of about a decade. When the archive reaches the decade-old stage, the tapes must be re-recorded, a substantial task. A digital archive that is file-based, of course, has no such limitation. It is easy to copy a file from one drive to another or from one city to another.

Like almost every other major news organization, CNN uses a staff of librarians to handle and manage the archival process. This new system will free the staff to handle more productive tasks such as research and consultation. The result will be stories with a richer

CNN: For the record

The CNN News Group is one of the largest news and information companies in the world. The hub of the CNN News Group is CNN/US, the network flagship. Altogether, the CNN News Group comprises six cable networks: CNN, Headline News, CNN International, CNN*fn*, CNN/SI and CNN en Español. In addition, the CNN News Group includes three private, out-of-home place-based networks; two radio networks; eight web sites; and CNN Newsource, the world's most extensively syndicated news service.

The reach of the CNN News Group is a bit overwhelming. Consider the following:

- CNN and CNN International combined can be seen in 190 million households in more than 210 countries and territories;
- The annual news budget for the News Group exceeds $500 million;
- The organization has 36 bureaus scattered around the world;
- There are 700 broadcast affiliates around the world.

CNN has enjoyed a number of milestones in its 18-year history. The network signed on the air as the world's first 24-hour broadcast news service on June 1, 1980. At that time, it reached 1.7 million cable TV households. It is easy to forget that, in the early years, success and respect did not come without effort. In April 1982, CNN won a suit against ABC, CBS, NBC and the White House to gain the right of equal participation in the White House Press Pool.

Through diligence and hard work, the network continued to expand its reach and win awards for reporting. If there was a point where CNN became a household name, it was in January 1991, at the beginning of the Persian Gulf War. CNN alone reported live from Baghdad on the night the air war began. A record U.S. audience watched the coverage. Worldwide numbers reached close to one billion, the largest audience of a non-sporting event in TV history.

Among the awards received for its coverage of the Persian Gulf War were the Golden ACE and George Foster Peabody Award.

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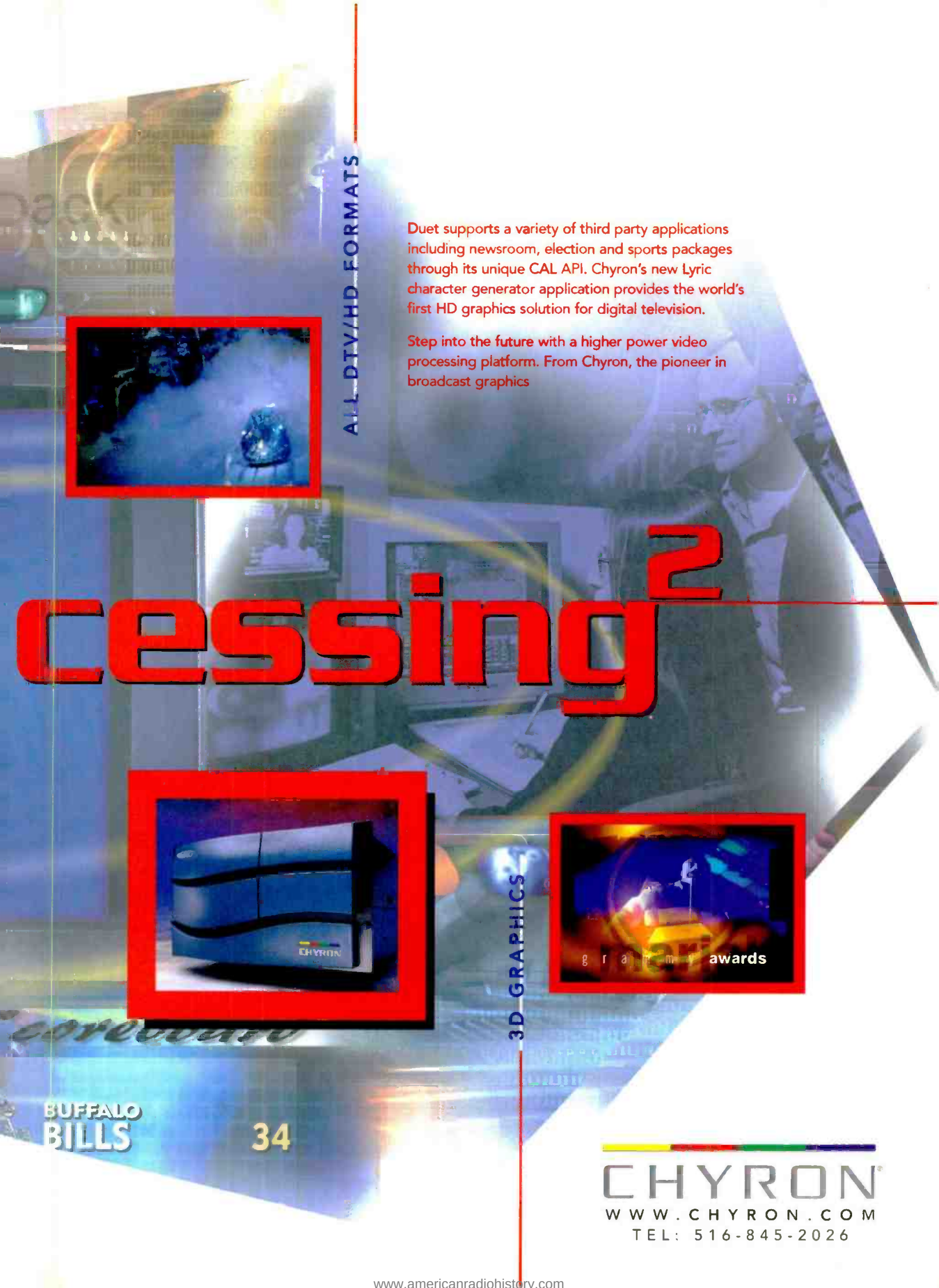

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set of information sources and elements. Such stories are, by definition, more interesting and useful to the consumer. In essence, this process raises the bar for news production by associating additional information with incoming material or by combing past material to produce a more complete package.

The centralized feeds operation, which serves CNN, Headline News and CNN International. All incoming material is captured and logged at these workstations.

This just in (from the field)

The amount of information that pours into CNN's Atlanta headquarters each hour is staggering. Up to 70 satellite feed sources are available. Right now, nearly all of that material lands on tape. The only exceptions are CNN/SI and CNN en Español, in which the feeds go directly into a NLE system. Moving the huge number of video feeds from a tape-based system to a non-linear system is a monumental undertaking, especially considering that the facility needs to continue to produce an on-air product 24 hours a day, seven days a week.

A key element of this transitional effort is the network's April announcement that it would be moving to MPEG-2-based digital field newsgathering systems over the next three years. CNN plans to replace the analog field hardware now being used by its 150-plus crews, serving all six networks worldwide, with MPEG acquisition and editing equipment. The first installment of this effort involves the purchase of MPEG-2-based Betacam SX (Sony) equipment. This move was based, in part, on CNN's belief that MPEG-2 has the potential to underpin the creation of an overall newsgathering, transmission, production and archival architecture that will permit the efficient multipurpose use of material without intergenerational degradation losses from multiple encoding steps.

"Our preoccupation is how to interconnect systems. That's the key to making all of this technology work efficiently."
Scott Teissler, senior vice president, new media strategy, and chief technology officer

With the wide variety of material that an organization such as CNN must deal with, the benefits of a standardized format such as MPEG cannot be understated. However, transcoding issues may still remain, and this issue is being addressed as well. MPEG transcoding is something that CNN expects in the near future, making possible — and practical — an all-MPEG production environment. This capability means that the material reaching the last compression stage to the consumer will be of the highest possible quality.

A related element of this effort is the development of a "go-anywhere" portable field-editing system. CNN worked with Sony to develop a portable field editor that is created by docking two DNW-A25 portable recorder/players together via the BKNW-225 docking kit. It was recognized early in this effort that the success of a true field-editing system depended on the ability to provide tape-to-tape assemble/insert editing and playback of multiple tape formats. The editing system weighs just over 30 pounds and is small enough to be carried onboard a commercial flight as carry-on luggage. One of the unique features is that the system will operate on batteries (12V), permitting field crews to edit tape while flying between locations.

Efforts such as this are important because one of the largest operating expenses for field newsgathering is the cost of shipping studio editors around the world with news crews.

Another benefit of editing in the field is that it tends to result in stories whose elements are kept more in context with the firsthand experiences of the reporter and/or producer. The more hands a given story passes through on its way to the final consumer, the more opportunities exist for sound bites and picture segments to be taken out of context, and the greater the possibility that some of the nuances of the story will be lost. ■

Editor's Note:
Input for the article was provided by Scott Teissler, senior vice president, new media strategy, and chief technology officer, CNN; Gordon Castle, vice president, research and development, production, CNN; Kevin Ivey, vice president, research and development, basic technology; Craig McMahon, director of graphics and post-production, CNN; Andy Mitchell, senior manager, public relations, CNN.

Jerry Whitaker is consulting editor and author of numerous books on broadcasting technology.

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SYSTEMS DESIGN SHOWCASE

Photo: Post Logic reception area.

Post Logic Studios goes HD

By the *BE* staff

In anticipation of the FCC's mandated conversion to digital television, Post Logic Studios, a Hollywood-based full-service video, film and audio post-production facility, has opened a 5,000-square-foot HD transfer facility. While other facilities across the country wrestle with how and when to go HD, Post Logic is already there: It is one of the few fully operational HD facilities in the world.

Offering the same capabilities as standard definition, Post Logic's all-serial digital HD 1080i telecine suite is already transferring film from major studios, such as DreamWorks, MGM, Paramount and Warner Brothers, to meet the demand for HD material. Such studios are planning for the day when networks order a film and it's ready to go, available in any format.

Currently, HD transfers require two separate masters: One version is a standard 1.78 (16:9) representation of the frame; the other is a 1.33 (4:3) pan-and-scan version sized for standard-definition television. The two separate masters are required because the resolution is not good enough for the necessary repositioning and sizing. Though the transfer resolution is 1080i (1920x1080 interlaced), the telecine actually scans progressively (1080p). However, there is currently no way to work with 1080p. Post Logic expects to begin such experimentation by the end of the year and, in the next six months, actually hopes to be editing HD

Post Logic Studios goes HD

pictures in 1080p. The goal is to be able to do transfers, visual effects and on-line assembly, all in HD. To meet this goal, Post Logic is taking advantage of its new facility, with its numerous design advantages.

On the second floor

Studio 440 Architects designed the second floor of the Hollywood facility. The floor comprises two identical HD bays, a separate QC/layback suite, business offices, a conference room, a machine room and a vault. Equipment selection was based on extensive testing and availability. As the technology continues to develop, Bays I and II will be re-evaluated and possibly upgraded.

Because the site's framing is wood as opposed to steel, the entire second floor of the HD facility had to be reinforced to support the weight of the post-production equipment. Once the reinforcement was completed, construction specialists began building the rest of the HD facility.

The video center

One unique design aspect of the telecine room is that, from video switching to color correction, the video remains in the digital domain. Concerns about having to replace some of the runs with fiber links were unsubstantiated, even with some of the runs exceeding 100 feet. For optimal equipment performance, the entire facility is temperature- and humidity-controlled and uses UPS for clean, uninterrupted power.

For the first bay, Post Logic chose the Rank Turbo III HD telecine and the Pandora Platinum with Mega Def/Pixi telecine controller, which incorporates a digital color-correction processor. A Digital Vision processor provides advanced noise/grain reduction, real-time dirt/scratch concealer and aperture correction with detail processing and defocusing capabilities. The facility is home to one of only three Panasonic 3100 series HD serial digital switcher/keyers in the world.

Post Logic's HD Bay I includes an NVISION serial digital routing system, a DVS still-store/RAM recorder, Panasonic 2700 D5 HD VTRs, Leader HD 5150 Scopes and a VAS downconverter with serial digital input. A Sony 2830 HD primary monitor has been installed, which fills the viewer's entire field of vision and includes a dimmable D65K backdrop. The bay can accommodate film and video projection, which allows the telecine operator to reference images during transfer sessions.

A machine room, projection booths, a vault and the two telecine bays are planned for simple, direct factory-like circulation of material and personnel. The machine room acts as the hub for Post Logic personnel but is separate from the circulation system used by the clients. Critical machines are placed in the machine room for adjacency to the telecine bays and the projection booths.

The Post Logic machine room.

The audio center

The most impressive audio feature of Post Logic's HD facility is that TMH Corporation independently qualified the design, equipment selection, and processes for optimal performance.

The firm conducted extensive testing to ensure optimal room acoustics. The Post Logic facility is the first to be TMH-qualified. As part of continuing qualification processes, TMH provides Post Logic an easy, repeatable way of confirming performance on a daily basis.

The telecine rooms are acoustically and vibration isolated from the building with a goal of NC-20. The audio control room measured flat ±3dB before EQ.

The HD telecine suites are appropriately optimized for Dolby surround sound and six channels of audio. Bay I is equipped with a digital Yamaha 02R sound console. All the front speakers and subwoofers are mounted behind wall coverings. A unique operator-controlled surround system provides two equally important modes for appropriate monitoring of the work at hand: A direct radiation pattern is available for intensive scrutiny of the audio, including detection of drop-outs; alternatively, a dipole radiation pattern, more closely matched to a theater environment, is used for judgments of proper theater-style sound and levels.

Controlling light and sound

The primary issues dictating the physical design were controlling color, color sequence, light temperature and light temperature sequence. The architecture was developed so that, as one enters the facility, color and light temperature gradually shift to those required in the color-correction bays. The corridor lighting is further con-

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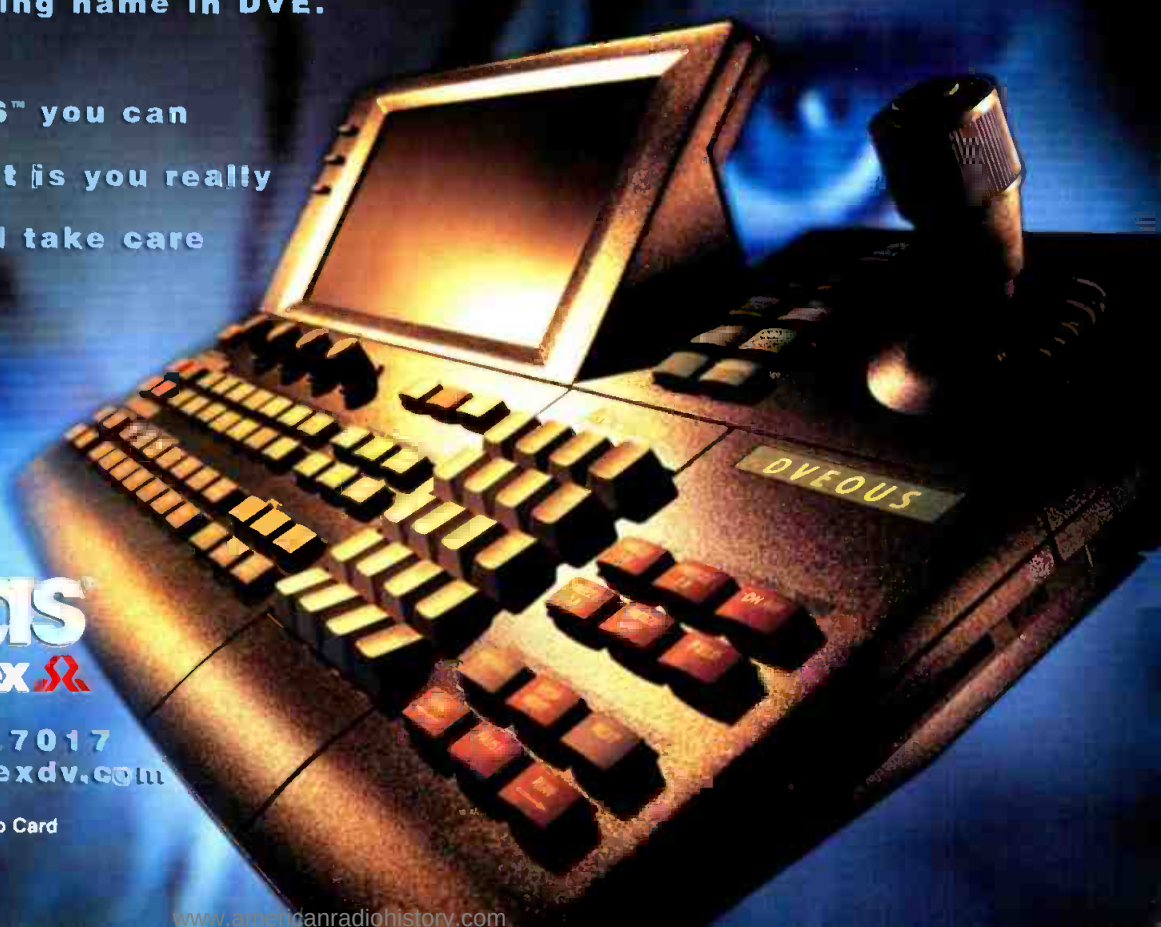

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trolled so that, when leaving and returning to the telelcine bay, the light temperature remains similar so that the eye can easily adjust.

In addition, the door to the telecine room may be opened mid-session without the difference in light temperatures being noticeable from the console. No visible light sources or fixtures that could produce glare are used, and natural lighting is controlled in accessory rooms.

The lighting fixture lamps within the telecine bays are either cold cathode set to 6,500°K for wall wash, fiber-optic strip lighting set to 6,500°K for illumination at the console, or PAR38 lamps with filament protectors to ensure non-glare task lighting.

Materials within the facility were chosen specifically for their color or effect under special lighting temperature situations, for their acoustic properties, or for both. Bronze metallic paint was used on paneling in the corridors to provide hue contrast at low levels of light. Clear finished lightweight MDF was used for cabinetry and wall paneling. All fabrics were reviewed for their acoustic properties and their response before use.

Each telecine bay is designed as an independent, isolated floating room. A lightweight concrete floating slab is used in conjunction with Mason Industries wall isolation systems. Mason engineers reviewed room needs and developed specifications for wall systems and loading conditions to ensure correct isolator response.

The raised access floor throughout the facility uses a lightweight concrete-filled steel pan. The mass and load bearing capacity of the system were dictated by the needs of the rooms and the substantial loading from the equipment. The floor system is left exposed in many rooms. There, the clear, sealed panels appear similar to terrazzo tile.

Meeting client needs

The work environment was designed to feel comfortable and familiar to clients even though the medium of video, and the facility itself, are breaking technical barriers. Although Post Logic's HD facility has access to all the amenities of the standard definition post-production facility on the first floor (including a complete cafe area), additional considerations were taken into account for the second floor. One example is the attention paid to security in the vault for protection of material before theatrical release. The vault is secured by coded proximity and security access doors.

As formats merge and the lines between production and post-production blur, Post Logic is prepared to offer its clients services at multiple locations. Post Logic's Westside facility in Santa Monica, CA, includes a new virtual bay that is linked to Post Logic Hollywood via video teleconferencing capabilities and a real-time uncompressed D1 fiber-optic data link. This virtual bay allows clients access to any of the Hollywood artists and services while working at the Santa Monica studio. Through two-way, face-to-face conversations on the video teleconferencing system and the ability to view the actual work product in D1 quality, Westside clients can see and hear as if they are in the same room as the Hollywood artists. ■

The telecine bay console.

Design team:

Client: Post Logic Studios

Engineering/Post Logic: Lou Levinson, director of theatrical mastering; Thom Ferman, director of engineering; Dave Iveland, HD chief audio engineer; Michael Barnhill, HD engineer; Donna Waltemath, general manager of theatrical mastering

Architect: Studio 440 Architecture and Acoustics, Hollywood, CA

Interior design: Studio 440 Architecture and Acoustics, Hollywood, CA

Lighting & acoustical design: Studio 440 Architecture and Acoustics, Hollywood, CA

Acoustical systems design and supply: TMH Corporation, Los Angeles, CA (Tomlinson Holman, co-founder)

Equipment list:

Rank Turbo III HD telecine

Pandora Platinum with Mega-Def/Pixi

Digital Vision electronic film processing

Panasonic Serial HD 3100 switcher/keyer with built-in frame store

NVISION serial digital routing system

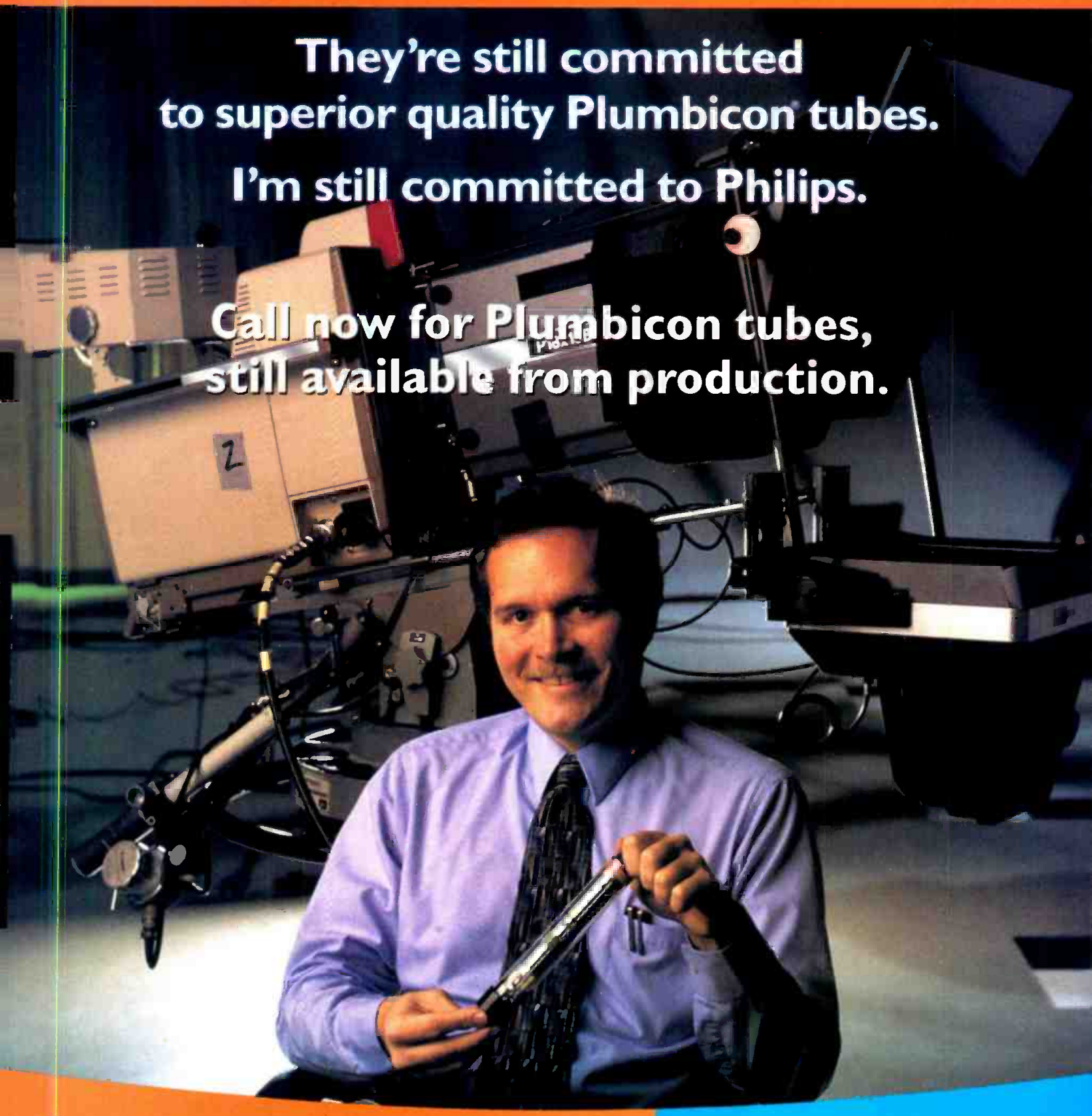
DVS Movie Video HD RAM still and clip store

Panasonic 2700 HD D5 recording

VAS Group downconverter with serial digital input

Sony 2830 HD monitor

TMH-qualified audio environment



In the world of constant change, it's good to know Philips Components is still producing their complete line of high-resolution, low lag Plumbicon tubes. And Philips is still standing by the broadcast industry too.

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NVISION Achieves the Impossible

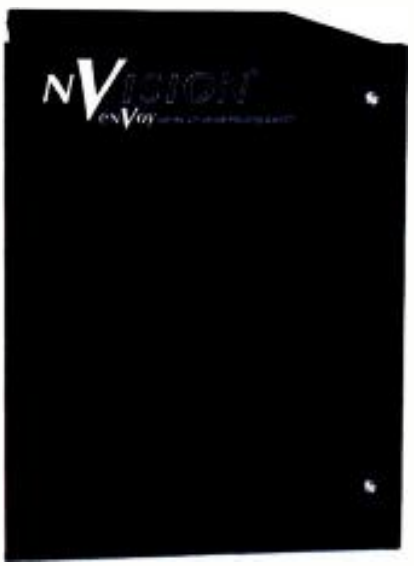
These days, the pages of this magazine, and others, are full of articles and letters discussing the transition to an all digital environment. DTV, DVB, DVB-ASI, and HDTV are the acronyms *du jour.*

Discussions often refer to the difficulties of creating and operating a multi-format system that will allow all of the desired digital formats to coexist—without adding a couple of trillion to the national debt, or significantly impacting the cost of medical insurance due to a massive surge in stress related illness.

"NVISION has surprised the industry by announcing a new family of universal digital video routers, ... called ENVOY."

Grass Valley, California-based NVISION has found some of the answers to these questions. For several years, NVISION has been helping the industry front-runners solve the difficulties of incorporating digital audio signals within a video system. Indeed they have introduced several 'firsts' over the years, including synchronous AES routing, dynamic data routing, and digital audio signal management. Apparently, this company has been quietly laboring in the California Sierra foothills to bring some astonishing developments to the market.

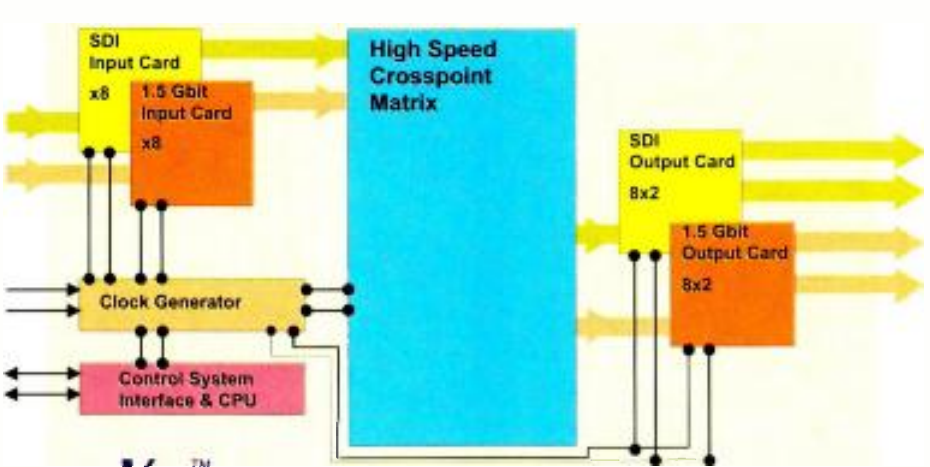
At the heart of any system is the routing equipment. New signal formats and standards often require that additional layers of routing be added due to lack of signal compatibility. Router manufacturers are telling our industry that in order to accommodate full bandwidth HD formats, switch sizes must be kept to 16^2 or 32^2, or additional and separate routing is required. When asked if HD-SDI (1.5Gbit) signals could be managed from within a large SDI routing system, the answer is resounding: "Impossible."



NVISION's ENVOY Series 6128 router

Many manufacturers agree that 1.5 Gbit routing is a relatively straightforward extension of 270 Mbit technology. However, most are able to provide only a limited solution for 270 Mbit/1.5 Gbit signal management.

NVISION has surprised the industry by announcing a new family of universal digital video routers capable of managing a wide range of signal formats.



enVoy™ Series Routing Switch, Block Diagram

This new router family, called ENVOY, is designed around a novel high speed crosspoint architecture that will handle data rates in excess of 1.5 Gigabits. This structure is combined with various I/O modules to accommodate several data rates. ENVOY users will be able to route any standard rate SDI signals *and* HD-SDI–within the *same* switch, at the *same* time.

Also, NVISION assures us that they have cured the problems associated with pathological signal content at both SDI and HD-SDI data rates, by developing novel design implementations for cable drivers, equalizers, and reclockers. And, the ENVOY design ensures that no signal inversions take place; for systems handling DVB-ASI data streams, this is essential. (DVB-ASI is NRZ coded and cannot be inverted.) These facts, combined with the ability to control the router from an existing control system, provide the user with tremendous flexibility.

Input and output modules include SDI (143,177, 270 and 360 Mbits) and HD-SDI (1.5 Gbit). Different I/Os can be included in the same switch, as can dual references to allow simultaneous dual standard 59.94 and 50Hz vertical interval switching. Outputs include dual connectors for each destination, to minimize DA requirements.

"ENVOY users will be able to route standard rate SDI and HD-SDI signals–in the same switch, at the same time."

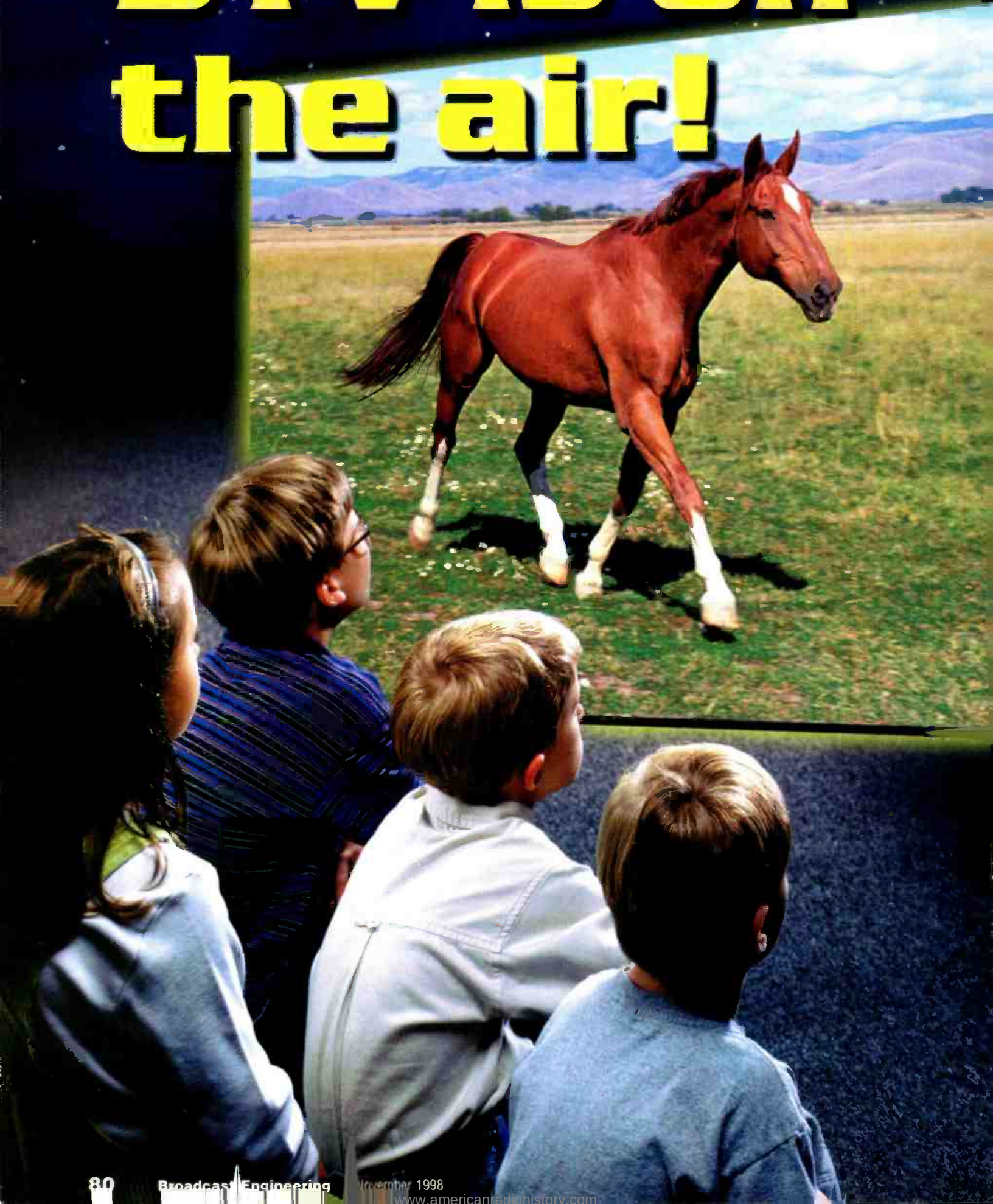
With the ENVOY series, digital video routing is available at competitive pricing. Three frame sizes are available: 64^2, 128^2, and 256 x 128.

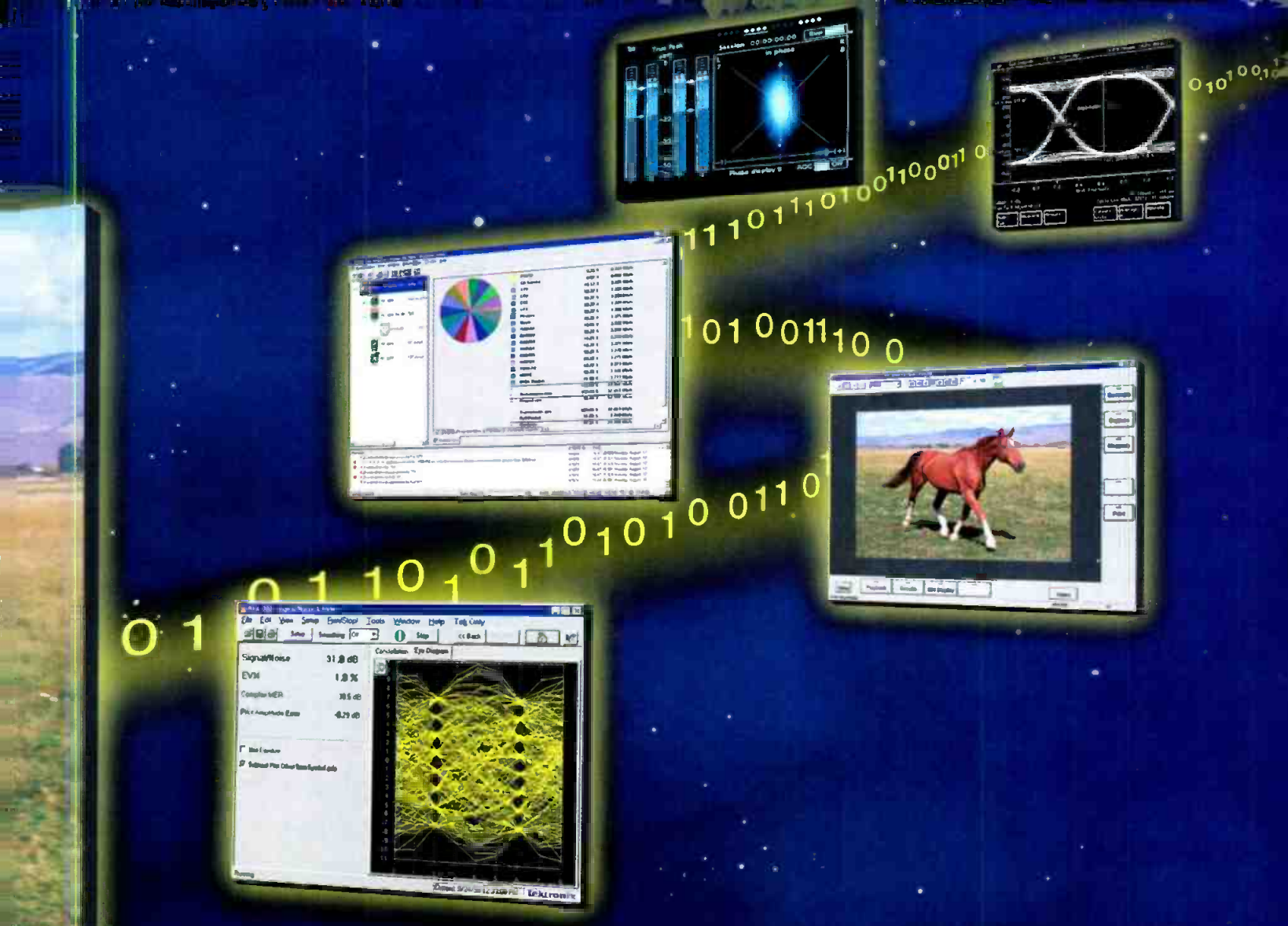
This new router series will enable users to purchase an expandable SDI router and add HD-SDI I/Os incrementally, as and when required.

Looks to me like NVISION has achieved the impossible!

NVISION can be contacted at 1 800 719 1900 or by fax at (530) 265 1021. You can visit their website at www.NVISION1.com.

DTV is on the air!





DTV is a reality. With 41 stations now transmitting DTV and HDTV images, consumer demand for digital quality, 16:9 images, six channels of high-quality audio and HD pictures is sure to grow. The successful stations will be those that recognize early on the opportunity this demand creates. This month's lineup includes three feature articles on how to maintain your new DTV system.

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Keeping audio and video in sync requires careful planning

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Understanding fake reality

Audio-to-video delay

Keeping audio and video in sync requires careful planning.

Photo: Audio plays an increasingly important role with DTV. Shown is a new audio control room at MTV. (Photo courtesy The Systems Group/Brian Rose).

systems for DTV

By Tom Tucker

Digital technology has benefited the professional TV industry in numerous ways. Many long-standing issues regarding bandwidth limitations, program archiving and signal distribution have been addressed. Further, equipment capable of producing spectacular special effects, thought impossible just a few years ago, is a reality today. However, along with these benefits, the transition from analog to digital has presented many new challenges. For most, the conversion to DTV requires multiple multiplexing/de-multiplexing and decoding/re-encoding stages. Within broadcast facilities, the audio and video signals are processed separately before being recombined into a single program stream for final distribution. Unfortunately, multiple encoding and decoding cycles, combined with separate video and audio signal paths, often produce significant cumulative timing errors between these signals. If these errors are severe enough and go uncorrected, they can cause annoying lip-sync problems, or worse.

A/V delay

It's about time

The importance of proper audio and video synchronization is nothing new. It was recognized years ago when early films featuring sound were introduced. Viewers were sometimes subjected to horrendous synchronizing errors when films were improperly threaded. In these cases, the problem was easy to see, and the fix was simple. As time went on, analog television provided new possibilities for audio-to-video delay problems. Even though the video and audio signals were recorded simultaneously, they were often backhauled and processed separately. In many cases, each signal path was subject to different propagation delays. While the audio paths were usually fairly straightforward, small video delays were common because frame synchronizers were used to re-time the incoming video feeds, synchronizing them with the station's timing reference.

Frame synchronizers work by adding a variable delay of up to several video frames to the incoming video signal. Each NTSC video frame is equal to approximately 30ms. Therefore, it's easy to see how, after several transport hops and synchronization steps, audio-to-video timing errors can accumulate throughout a system. These errors can become a significant problem if the audio signal is not delayed to match the video signal.

Today, audio synchronizers slaved to video synchronizers are commonplace. These devices help maintain a fixed audio-to-video timing relationship. However, this method only compensates for the delay the station's own video synchronizer adds to the incoming video signal and cannot correct for any existing audio-to-video delay variations. When incoming feeds are not properly synchronized, skilled operators must manually assess and adjust the audio-to-video delay synchronization. This method requires constant attention, as the audio-to-video delay error of the incoming feed can vary over time. Additionally, to detect errors, operators must rely on the presence of suitable program material with good audio-to-video correlation.

It has been proved that a skilled operator, given the time and suitable program material, can detect timing differences as small as 33ms (one frame). However, how much time can station engineers devote to diligent, manual monitoring of incoming program feeds for audio-to-video delay errors? More likely than not, the "automatic" audio synchronizer units are set to some predetermined delay compensation and left there, with only an occasional check to see if the control dial has been bumped.

Viewer beware

The importance of controlling audio-to-video delay errors should not be taken lightly. Errors as small as two video fields (one frame) can degrade the viewer's enjoyment of the program. In the natural world, we have been conditioned to expect the audio signal to be slightly delayed with respect to the visual image. This is because sound waves travel slower than light. Therefore, we always expect to see the bat hit the baseball before we actually hear it hit.

In today's broadcasting environment, audio-to-video delay errors consist almost entirely of video delayed with respect to audio, primarily because the video signal receives the majority of the processing attention. The unnatural effect of audio advanced with respect to video is the reason that, even with relatively minor errors, viewers experience a subconscious degradation in program enjoyment. This is not desirable for producers spending tens of thousands of dollars on a single commercial.

Audio-to-video delay errors could prove even more of a problem with the introduction of high-definition television. At least for the foreseeable future, as broadcasters struggle with upgrading their facilities, high-definition "islands" will be used in most standard-definition facilities. This strategy calls for substantial additional processing, possibly leading to even more delay errors of the audio-to-video timing before final emission. The improved high-definition image and 5.1 channel surround-sound quality may actually compound the problem because audio-to-video delay errors might be more noticeable to viewers who expect more from their entertainment investment.

The broadcast facility

Clearly, TV broadcast facilities need to be designed with audio-to-video synchronization in mind. One solution is to embed the audio signal into the video signal. In theory, proper audio-to-video timing is maintained, because the audio and video travel together as one signal and are therefore subject to the same delays. Digital technology has made this approach practical. SMPTE 272M specifies a formatting method for embedding up to 16 channels of 24-bit digital audio directly into the SMPTE 259M serial digital signal.

At first glance, embedding digital audio directly into the video signal seems to offer tremendous benefits over dealing with separate audio and video signal paths. Reduced cable and distribution requirements as well as simplified routing appear to add up to real cost savings. However, most of today's facilities cannot take full advantage of em-

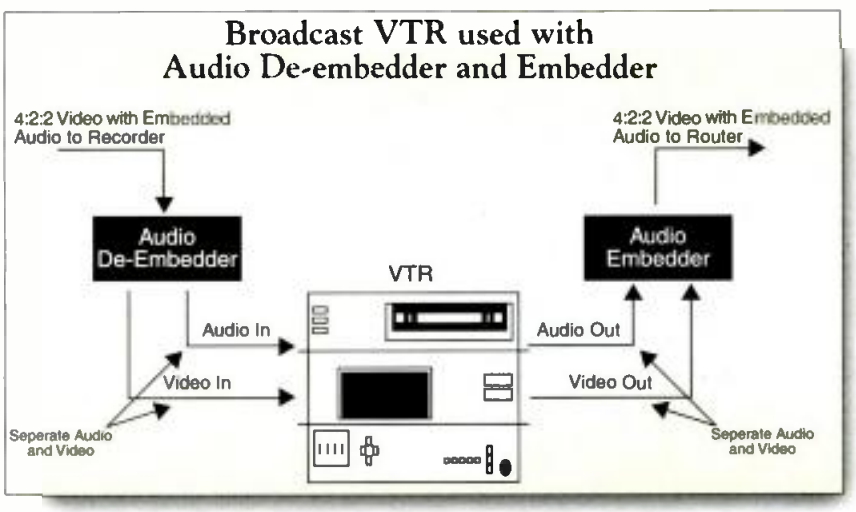


Figure 1. Audio de-embedders and embedders must be used with many devices not designed to directly handle audio embedded in the serial digital video bitstream.

bedded audio technology because many of today's professional video devices do not pass or maintain the embedded audio. Therefore, each of these devices requires an embedder for playback or a de-embedder for recording (see Figure 1).

Embedded audio also creates headaches for post-production. By definition, post needs to process video and audio separately. In an all-new facility with a 32x routing system, given the current cost of embedding equipment, the total cost of an embedded system could be double that of using conventional separate routing of video and audio. Regardless of cost, it is impossible to achieve correct clock and phase-locked AES digital audio from devices locked to 525-line video references. This is because the video-frame alignment and phase relationship between embedded digital-audio signals are arbitrary — there is a non-integer number of AES blocks in a 525-line video field. This non-integer relationship creates additional problems in post when trying to achieve a clean audio transition. Embedded audio does have its place, especially in systems that require simplified routing with limited switching requirements. However, facilities transitioning to digital are likely to find it advantageous to maintain separate audio and video routing for some time to come.

Many broadcasters will actually choose to upgrade gradually to digital over the next four to five years, while continuing to use large portions of their existing NTSC facility. This implies that a number of encoders, decoders, ADCs and DACs will be used to bridge the analog and digital facilities. Some of these devices may be cascaded, and each has the potential to process the video differently, contributing various amounts of delay to the video-signal path. Add to this the various signal-routing switching that occurs throughout hybrid facilities, and it becomes clear that unexpected audio-to-video delay errors can easily occur and may be difficult to control.

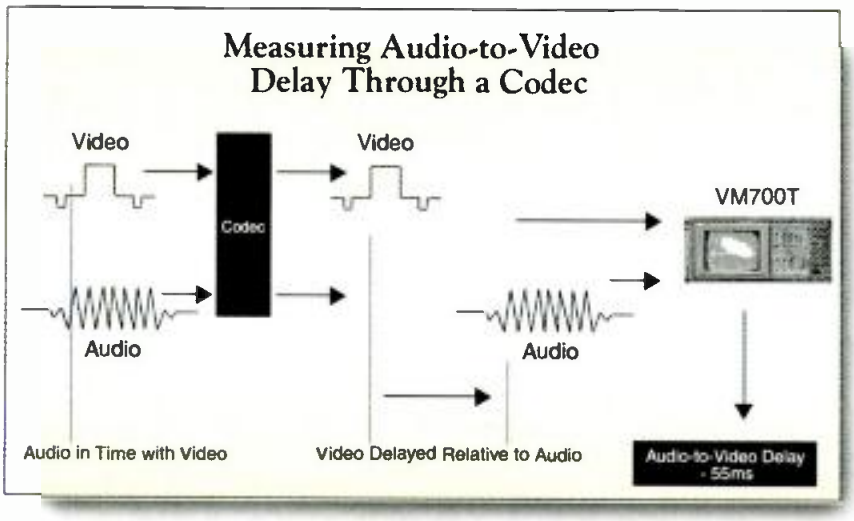


Figure 2. Audio-to-video timing relationships can vary through various compression codecs. Test equipment must be used to characterize these systems.

Delay measurements

Automatically measuring audio-to-video delay is a fairly complex problem. The solution requires the simultaneous acquisition of both the video and audio signals and an analysis of their relative timing. Today, measuring the delay accurately requires out-of-service testing. One method uses a video test signal that bounces from black to white every five seconds, combined with a synchronized audio chirp. This is essentially an electronic form of the slate board used for film.

Audio-to-video delay problems through MPEG-2 systems can seriously compromise the final entertainment quality of the program. Typically, the audio-to-video delay through an MPEG-2 codec pair should be constant over a given bit rate and video-motion complexity. However, verification of the audio-to-video delay through an MPEG-2 codec pair requires a slight refinement of the audio-to-video delay test-signal sequence. To properly test an MPEG-2 encoder, several moving video sequences should be used, each with varying degrees of motion complexity (see Figure 2).

One solution is to place the video-bounce test signal on a single video line within the active video area. The remaining active video lines can then be used for the moving video test sequence. Bear in mind that, to characterize an MPEG-2 encoder/decoder pair, the decoder needs to be verified separately.

Special MPEG-2 audio-to-video delay test sequences are available on CD-ROM and can be played from some protocol analyzers directly into an MPEG-2 decoder. These CD-ROMs contain test-video sequences with varying degrees of motion complexity and audio-to-video delay, allowing complete characterization of the MPEG-2 decoder's performance.

Audio-to-video delay measurements become much more complex with live, *in-service* programming. In this case, the bouncing video test signals and audio "chirp" tones required for out-of-service testing are not practical. By nature, test signals disrupt the live signals, destroying the program's entertainment quality. Technologies have been developed (or are currently in development) that attempt to use the ancillary data space or even unused bits in the serial-digital-video signal for embedding audio timing data that can be used to calculate audio-to-video delay.

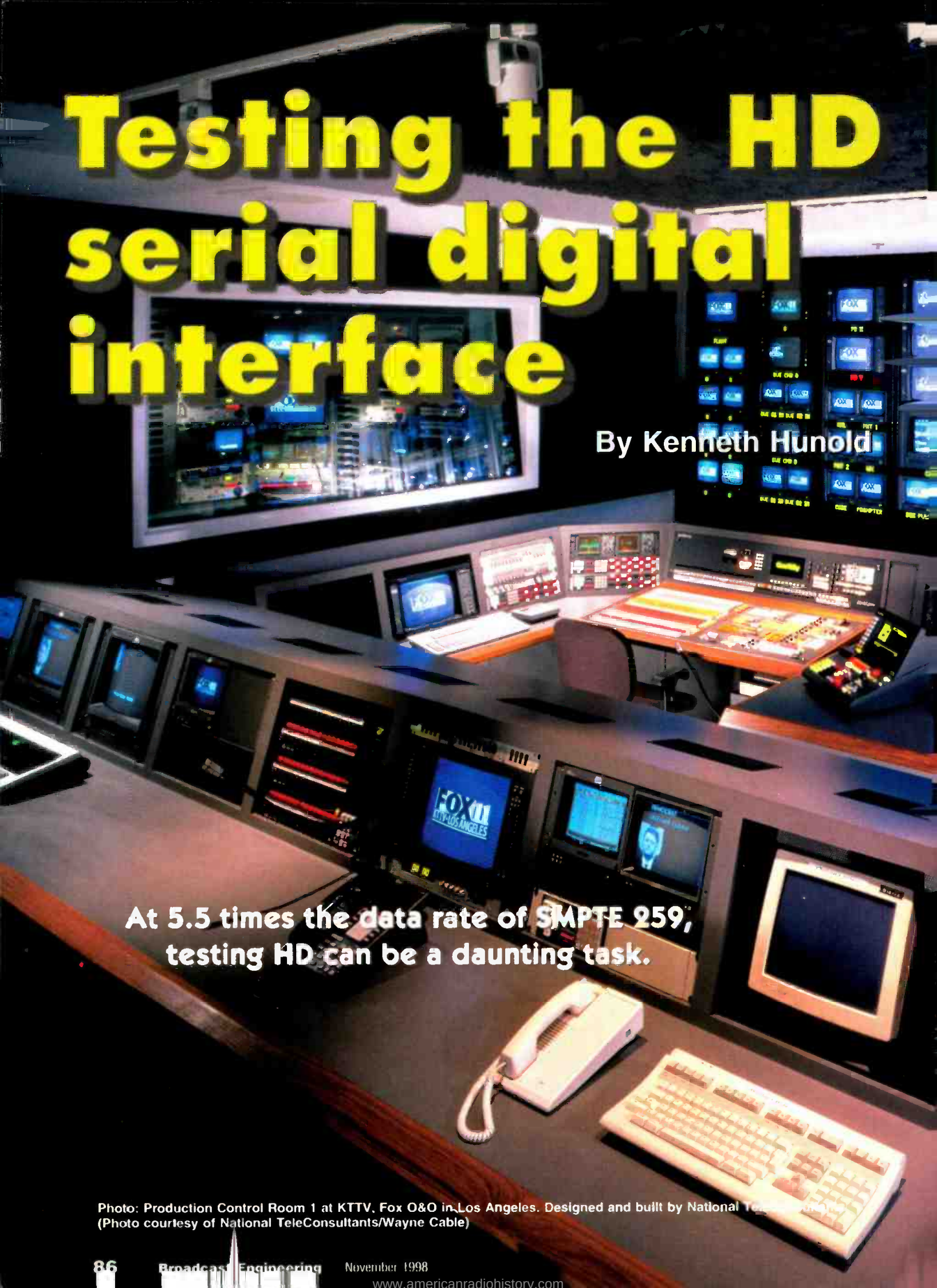
However, these technologies are not 100% reliable because many professional devices used in broadcast facilities either modify or simply do not pass this embedded information. Complex audio and video signal processing has become commonplace in broadcast facilities transitioning to digital. To survive this complexity, successful audio-to-video delay measurement technology must not be based on the use of the video vertical interval, ancillary data space or even unused bits of the serial digital signal.

Although audio-to-video delay is not a new phenomenon, it is receiving renewed attention as broadcasters struggle to upgrade their facilities with digital technology. Viewer perception of program quality can be compromised, even with minute audio-to-video delay, and this problem is expected to become more critical with the introduction of high-definition television into the home. Broadcasters need to understand where and how these signal delays occur and ensure they are effectively dealt with. ■

Tom Tucker is a product-marketing manager for Tektronix Inc's television test product line in the company's measurement business division, Beaverton, OR.

Testing the HD serial digital interface

By Kenneth Hunold



At 5.5 times the data rate of SMPTE 259, testing HD can be a daunting task.

Photo: Production Control Room 1 at KTTV, Fox O&O in Los Angeles. Designed and built by National Te
(Photo courtesy of National TeleConsultants/Wayne Cable)

The development of a serial digital interface, as opposed to a parallel digital interface, has always been a major factor in the acceptance of digital video (and audio) systems. The parallel interface, in which each active bit of a digital signal is carried on its own wire pair, is extremely difficult to implement. Parallel interconnection mirrors the parallel processing structure used within devices that process and manipulate digital video. *Serializing*, or rearranging, these bits for sequential transmission over a single wire pair (often a coaxial cable) has accelerated the acceptance and hastened the implementation of digital systems.

Case in point: Component analog video, in its many forms, never caught on (despite the advantage of better signal quality) because it required multiple cables. The component serial digital interface, developed in the late '80s, began the migration from composite digital systems to component digital systems, primarily because the single coaxial cable system was much easier to implement than the three-coax analog implementation.

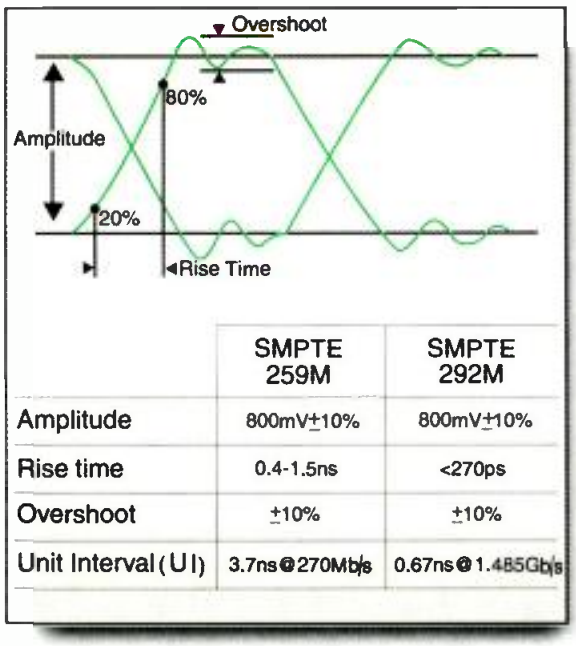
In the high-definition world, component analog implementation has been around since the days of Thomas Edison (depending on your definition of high definition). SMPTE 240M describes a system of three analog components with a bandwidth of up to 30MHz. SMPTE 260M describes a digital implementation, with each of the eight data bits carried on its own twisted-pair conductor. A more recent digital HDTV interconnection standard used a 50-pin "D" connector and was used as a matter of necessity, not convenience. To successfully implement digital HDTV systems, the development of a serial digital HDTV interface standard was needed.

SMPTE 292M

Fortunately, a standard for serial interconnection has been set (SMPTE 292M), and equipment conforming to that standard is being built. The standard described is capable of serializing and transmitting 10-bit component data that has been sampled at 74.25MHz. For the purpose of this article, only values for the 60Hz variant of the standard will be used. North American production houses will most likely use the 59.94Hz version to maintain vertical frame-rate synchronization with their 59.94Hz NTSC facilities, which are likely to remain operational for some time. The actual sample rate for such a facility will be 74.25/1.001MHz (or 74.175824...MHz.) The numbers are much neater if the 60Hz variant is used. The actual values will differ by 0.1%.

The data rate for this serial interface can be determined in the following manner: SMPTE 240 specifies 2200 total samples per line, 1125 total lines and 30 frames per second. These are not the same as 1920x1080, which refers to *active* picture samples, not the total number of samples. SMPTE 296M specifies 1650 total samples per line, 750 total lines and 60 frames per second. Each standard's calculation is 74.25 million

samples per second. At 10 bits/sample, the result is 742.5Mb/s. When the chrominance samples are combined with the luminance samples (the two channels of chrominance data for Y/B-Y/R-Y systems are sampled at half the luminance rate), the data rate doubles, creating a total of 1.485Gb/s. This is a serious load of data to transport. This high-definition serial digital interface (HDSDI) is 5.5 times the data rate of standard-definition SDI (SMPTE 259M). It wasn't too long ago that broadcasters were wondering how to transport the 270Mb/s signal through their facilities. With the advent of high-definition television, the ante has been upped considerably.



	SMPTE 259M	SMPTE 292M
Amplitude	800mV±10%	800mV±10%
Rise time	0.4-1.5ns	<270ps
Overshoot	±10%	±10%
Unit Interval (UI)	3.7ns@270Mb/s	0.67ns@1.485Gb/s

Figure 1. Eye-pattern specifications for SMPTE 259M and SMPTE 292M.

Using the numbers in the SMPTE 292M standard, if a link budget of 20dB at half the clock frequency is allowed (as recommended in the standard), considering the loss of common serial digital cable, the estimated transmission distance is approximately 100 meters (330 feet). When the first implementations of HDSDI were released, this estimate was fairly accurate. Fortunately, the standard states that serial receivers designed to work with greater or lesser signal attenuation are acceptable. Some of the latest generation of serial receivers will work with link losses that approach 30dB at half the clock frequency, equaling the specification of the SMPTE 259M standard-definition interface. These numbers will likely increase the length of cable over which the HDSDI signal can be transmitted.

Testing HDSDI

There must be a method for testing an interface once it's developed. Because the HDSDI standard is similar in form to the standard-definition interface, many of the same parameters must be checked. However, the values of these parameters differ considerably. The raw data is scrambled using the same method (i.e., the same scrambling polynomial is used before coding), so the same pathological tests can be used. The coding used in the HDSDI standard (NRZI) is also the same. Originally it was thought that, because the data rate of the HDSDI signal was so high, pathological signals would not pose a problem. This assumption has proved incorrect: Pathological testing is still important. Problems with the DC content of the signal (one of the conditions that the pathological test signal was designed to test) are actually more of an issue with HDSDI than they were with the standard-definition SDI. Perhaps this is because manufacturers are investigating other semiconductor industry devices (the cellular phone and computer industry) as nontraditional solutions to these problems.

As the HDSDI standard is rolled out, it is important to test the interface, as well as the data it carries, to a common standard. As equipment manufacturers and component developers introduce their implementations of this standard, each product's compliance with the standard must be confirmed to ensure interoperability. When one piece of equipment doesn't work with another, it is often up to the customer to determine which device is at fault. In all fairness to manufacturers, sometimes problems arise from ignorance of the standard or ambiguity contained in the standard document itself. Often, products are developed before the standard document is finalized or from an earlier standard document another organization has issued. This is why standard documents are reviewed periodically and are revised when necessary.

Because implementation of any new system requires so many steps, it is often difficult to determine where problems lie. Regardless of the system through which an HDTV signal may pass, the HD camera signal originates as an analog signal at the camera head and is converted to an analog version of the original signal for display. When attempting to measure either the HDSDI interface or the data encoded on it, one must quantify any conversions along the way. Numerous A/D and D/A conversions may occur along the signal path. If the monitoring device uses a D/A converter as part of its display system, the effect of that converter on the measurement must also be weighed.

Analyzing the HDSDI interface is still an elusive pursuit. A 1.5GHz signal can certainly be measured, but the tools required are not usually part of the broadcaster's tool kit. To measure a 1GHz square wave requires an oscilloscope with a bandwidth of approximately 4GHz. Another problem with measuring this signal is that, like most parts of the TV system, the HDSDI interface is specified with a 75Ω impedance. In the gigahertz range, it is difficult to find equipment that features a 75Ω impedance, much less BNC connectors. Even the old trick of using a "T" connector and a 75Ω termination on a high-impedance scope input can be difficult. The plumbing involved introduces other effects into the measurement and affects the return loss. One trick is to use the internal termination (often 50Ω, and typically valid up to the design limit of the scope) and evaluate the shape of the waveform (the eye pattern). The signal's amplitude can be measured (terminated with 50Ω — not the specified 75Ω), and a correction factor can be applied to account for the different impedance. This allows amplitude measurements to be approximated, but the measurement can also be affected by other parameters. One is the assumption that the signal's source impedance is really 75Ω — which may not be true at these frequencies. The source impedance can be determined with a network analyzer, but this, too, is not a common tool at many facilities. The network analyzer must also be checked to see whether it has a 75Ω impedance. In short, these methods can

estimate, but cannot accurately measure, interface parameters such as amplitude, rise-and-fall times and overshoot (see Figure 1). Solutions to this problem should be forthcoming.

Similarly, interpreting the data on the interface can be difficult. As with many other operations, the serial data must be deserialized into 10-bit parallel data for analysis. Subsequently, several options are available. This data can be analyzed as a spreadsheet or displayed as a waveform, similar to a digital storage oscilloscope (DSO). If the data is displayed in tabular form, sample values can be observed and analyzed to help spot errors.

Often, problems that could be attributed to A/D or D/A converters must be verified to see whether they exist in the digital or analog representations of the signal, or in both. This can be done by assessing the values of the individual samples and determining the position and amplitude of any problem from the data before it is converted to analog for display. Often, such problems as picture shift (horizontal or vertical) and bars or lines in the picture can be pinpointed by analyzing the data directly.

Numerous tools exist for analyzing standard-definition (270Mb/s) SDI data. Ideally, all of the tools and procedures available for the SDI interface will be available for the HDSDI interface, given the design similarity between the two. This is easier said than done. Many times, the video data on the interface is correctly represented, but the control information and ancillary data are not. All of this data must be verified for compliance, or problems can arise. As with the 270Mb/s interface, EAVs, SAVs, CRCs, embedded audio and other variables need to be correctly coded and in the right place before everything will work.

Though it may seem obvious that there are differences between the 720-line implementation and the 1000+ line implementations of the standard, the differences between the 1035 and 1080 versions of the standard should not be overlooked. The active picture starting and ending lines are different for each standard. There are also many other differences among the various scanning formats that share the SMPTE 292M interface (see Tables 1 and 2).

Although operating the SMPTE 292M interface between just two points would be ideal, once this equipment is mounted in a rack and committed to day-to-day operation, it is unlikely that a single piece of cable with a connector at each end will be all that is inserted into the path. The signal will eventually be amplified and split for distribution or routed via a routing switcher. A typical path will include multiple connectors, patch panels and different types of cable. All cable connections and patch panels should have a 75Ω characteristic impedance. The return loss spec for SMPTE 292M (which is directly related to impedance) is 15dB up to the clock frequency of the signal being transmitted (usually 1.485GHz.) This is not an easy spec to meet, and very few products designed for 270Mb/s operation will be usable at 1.5Gb/s. Mixing different cable types is acceptable, as long as the cables (and their connectors) are designed with a 75Ω impedance. Even 8281 could be used, but the allowable length of cable would not be as great as a similarly sized cable with a foam dielectric.

Table 1

	Specification	Active Pixels	Frame Rate
Interlaced			
	SMPTE 260M	1920x1035	30/29.97
	SMPTE 296M	1920x1080	25Hz
	SMPTE 274M	1920x1080	30/29.97/25
Progressive			
	SMPTE 274M	1920x1080	30/25/24/23.97
	SMPTE 296M	1280x720	60/59.94

Table 1. Active pixel counts and frame rates for several formats that can be carried over the SMPTE 292 interface.

Table 2

Specification	SMPTE 260	SMPTE 274	SMPTE 296
Active Pixels	1920x1035	1920x1080	1280x720
First Line	41/603	21/584	26
Last Line	558/1121	561/1124	745

Table 2. First and last line designations for SMPTE 260, 274 and 296.

Equipment requirements

What kind of test equipment will be needed for the HDSDI interface? At a minimum, a test generator that can produce the usual color bar signals for level setting of D/A and A/D converters will be needed. The color-bar test signal could also be used as a source signal for interface jitter measurements. As with any generator, depending on the intended use, a group of monitor test signals or analog system linearity test signals could be included. For HDSDI receiver testing, pathological patterns similar to those used in the 270Mb/s interface will be needed.

For monitoring the signals on the interface, a waveform monitor for the data carried on the interface will be needed. This display could be as simple as an ordinary waveform monitor fed by an internal D/A converter, or it could be a synthesized display assembled from the actual sample data values. From a manufacturer's point of view, the generator could be "multistandard," providing data in any (or all) of the different scanning formats that can be carried by the interface (e.g., 1080, 1035, 720, 480).

Although equipment is available that fills all the needs for testing the HDSDI interface, the list is not complete. Some signal generators can generate signals to evaluate the performance of MPEG compression systems. This is a developing area, and these signals could be included as part of an HDSDI generator. MPEG compression is often used with HD images, so it is appropriate to address these testing chores together.

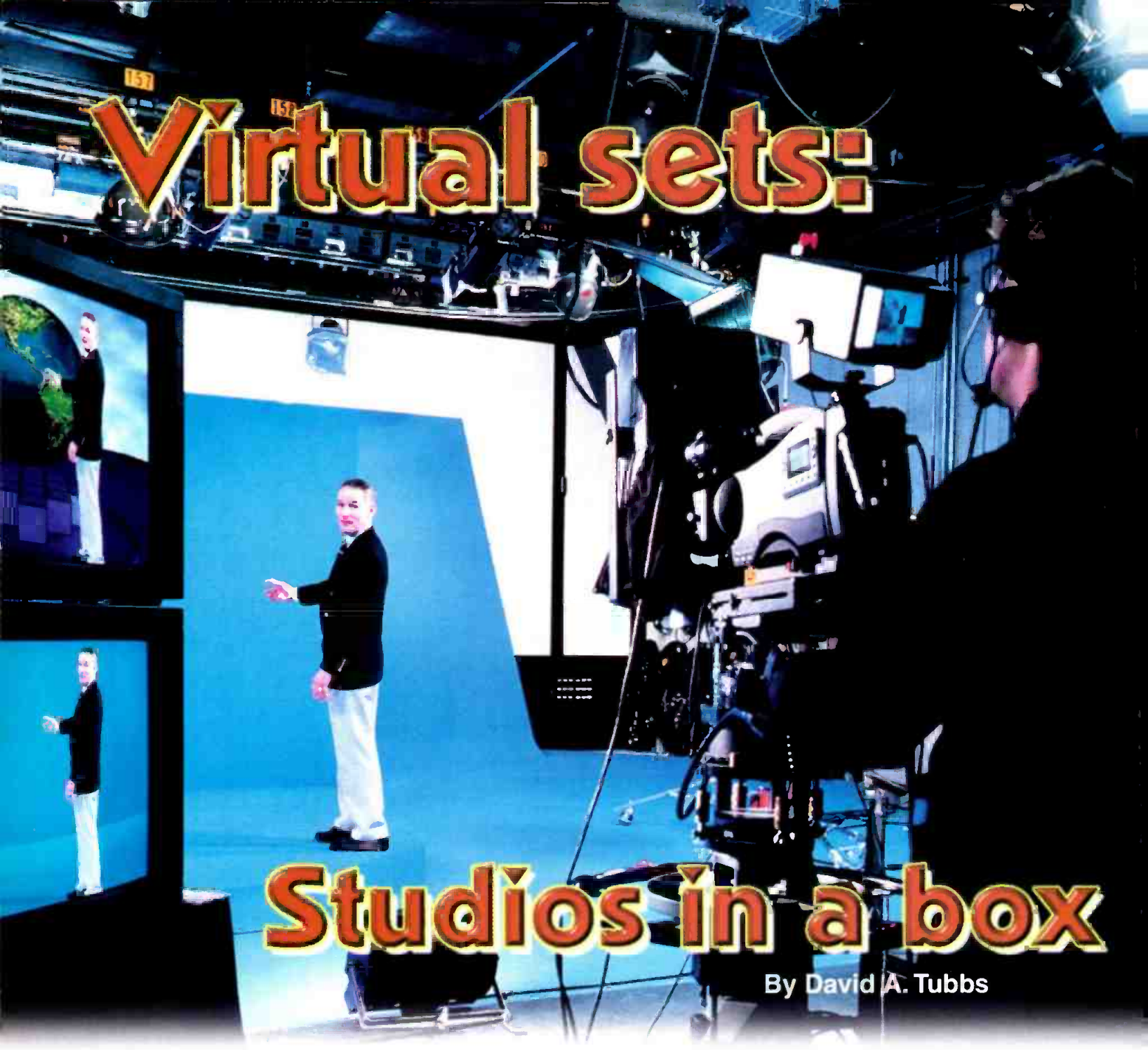
Testing the HDSDI interface is still a new adventure. However, more broadcasters will have to deal with this testing as the industry makes the transition to high-definition digital broadcasting. We are building on the knowledge-base formed during the past decade and relying on our current tools as we implement higher data-rate interfaces. And there will be many new challenges along the way. ■

Kenneth Hunold is an audio/video project engineer for the ABC Engineering Laboratory, New York.

Virtual sets:

Studios in a box

By David A. Tubbs



Virtual sets take blue screens beyond the typical chroma key. Shown here is KSL Mark Eubank testing a new virtual set design from Evans & Sutherland.

Virtual studio technology, once the domain of million-dollar studios, is finally finding applications in local stations at reasonable prices.

The advent of cost-effective virtual sets is resulting in a fundamental shift in the way programs and content are produced. News directors, TV producers and filmmakers are applying this technology in unique ways to create programming that is more interesting and enjoyable to produce and to watch.

Unlimited creativity

Virtual set technology is an *enabling technology*, in that it enables producers to excite, inform and involve viewers in ways that traditional production methods cannot equal. Virtual sets unleash power in the production of content that captivates audiences: They free set designers from the physical confines of the sound stage and allow graphic artists to simulate any

environment. A news anchor, once restricted to a news desk and a few square feet of space, can now report from anywhere in the world — or in the universe.

Until recently, the creative gold mine that virtual sets have afforded has been available only to those with gold mines of their own. The purchase and associated operational costs of virtual sets have prevented wide-scale adoption of this technology. In addition, the software-development tools used to create virtual sets have been expensive, and few users have possessed the skills necessary to use these tools.

The people who would benefit most from this new technology (such as independent producers and creative visionaries) have, in effect, been denied access because of its prohibitive cost.

So what's in a virtual set?

The virtual set is a new application of existing computer technology and video techniques. Most of these elements have been around for years. The blue screen, or cyclorama, can be traced to filmmaking in the 1950s. Lighting, grip and stage components date back even further. Chroma- keying, in which the weathercaster's camera image is taken off the blue screen and inserted on top of the 2-D weather map, has been a TV-industry staple for more than 30 years.

As analog gave way to digital datastreams, new capabilities emerged. One of the most significant was *digital compositing*, a technique developed in the early 1980s, which allows an infinite number of digital image layers to be seamlessly merged to form a single, composite image. Used universally by special-effects houses, it merges background scenes, animated elements and on-stage talent.

The most important component of a virtual set is the real-time graphics computer used to generate the imagery. These *image generators* trace their origins to military and commercial flight simulators developed in the late 1960s.

The image generator also stores in memory a 3-D mathematical model of the set, along with *texture maps* that are applied to the surfaces of the model. Between the mathematical model and the texture images, a complete set — or *database* — is created.

Using set-design software, the virtual set shown above was electronically created. The photo on p.90 shows how this set appears with the weathercaster in place.

Creating reality

To create the set database, *modeling tools* are used with a graphics workstation. The set designer creates and manipulates the set in 3-D. Displaying the set under construction on the workstation, the set designer can add or delete objects from the database. These objects can be as simple as a wall or a painting, or as complex as a busy metropolitan intersection. Once the objects are added, their position in the set is assigned, and texture maps are applied.

The most important component of a virtual set is the real-time graphics computer used to generate the imagery.

Camera tracking is crucial to virtual sets. The system must know where the camera is pointing to determine what parts of the set are viewable. All virtual sets use some form of camera tracking to determine where the camera is and what it sees. Information must be gathered about the camera's position in the set (x, y, z) as well as pan, tilt, zoom and focus. All of this data is converted into positional information and is used by the image generator to re-create the scene just as it would look as if viewed through the camera. There are a variety of camera-tracking systems, from mechanical sensors to complex pattern-recognition systems.

Billions of computer operations are required to render a single image. The image generator breaks the rendering operation down into a sequence of incremental, or *pipelined*, processes. While this helps speed the process, it also introduces *transport delay* (lag time through the system). Imagery coming out of the computer lags the camera video. To compensate, video and audio delays are required to synchronize the camera and computer images. The amount of transport delay is based on the camera tracking method and the image generator.

System choices

Virtual sets give users a variety of options and production/technical choices. The first choice to make is that of *real-time* or *pre-rendered* sets, an option that contains hidden cost factors.

Pre-rendered sets are often adequate when the production technique remains static or relatively unchanged. When the camera shots are tightly controlled and are highly repeatable, you may not need real-time capability. Examples of this type of set include news drop-ins and weathercasts. Other short-form and fixed-presentation programs can benefit from pre-rendered sets.

You might think that talk formats would benefit from such pre-rendered

sets, but that's generally not the case. When the talent moves, interacts and behaves unpredictably, real-time set rendering is a better choice than pre-rendered sets. Real-time set rendering allows the director to move from camera to camera and allows the cameras to move from person to person without concern about the background or set environment.

As shown here, the physical sets used with VR systems needn't be complex or large. In fact, one of the advantages of a VR set is that is can help create the illusion of space where there is little.

Real-time sets also allow the talent to move freely within the set environment. Also, real-time sets give the talent and the set a sense of interaction. The talent benefit from real-time sets by being able to see changes in their position relative to the camera and set as they occur. All of these elements impart a sense of realism to the audience.

Finally, real-time sets can easily be modified and controlled by directors, which adds another layer of creativity. Don't underestimate the value of this production factor, especially in a live news production.

Camera requirements are a key (and often misunderstood) aspect of virtual sets. If your cameras, especially lenses, are older, be sure the virtual-set manufacturer understands this. Because camera and lens positioning sensors typically have some latency, the software must compensate for it. The issue isn't the latency. Rather, it's repeatability. If it takes 2ms for a certain lens movement, there's not a problem. However, there is a problem if that same lens movement varies from, for example, 2ms to 4ms, without repeatability.

Lighting is still a crucial issue. Make sure the set is lit by someone experienced in blue-screen applications.

Finally, while almost anything can be designed into the set, looking realistic is still a key aspect of virtual-set design. Aliasing, excessive contrast and unnatural colors or patterns can make the set look artificial. If you want a set that looks supernatural, an unrealistic effect works well. On the other hand, it does not work if you're trying to place an anchor in a realistic environment. Manufacturers deal with this issue differently, but it must be considered.

Applications

Until recently, virtual sets cost about the same as similar high-quality wood-and-paint sets. Early virtual sets could cost $500,000 or more per camera. With this kind of financial commitment, it was difficult to justify any production other than large-scale network broadcasts or special events, such as election-night coverage.

Because of improved computer technology (more horsepower at a lower cost), the entry price for an open-architecture-based system has fallen. Today, it's possible for almost any facility to acquire the technology. Set design is now limited only by the user's imagination, not his or her pocketbook.

Following are a few examples of virtual-set technology applications made possible by the technology's lower cost:

Local news origination. No longer just a network technology, virtual sets can allow local stations the creative freedom needed to capture a larger piece of their markets. By applying sets in a creative way, these stations can develop a new level of interest in their programming. New venues can be created to support the news, weather and sports components of news broadcasts, with different sets for times of the day, seasons, holidays and special reports.

Corporate training. In today's aggressive marketing environment, more companies are maintaining their competitive edge by enhancing the training they provide to customers and employees. Imagine going inside an engine to teach mechanics how to do a tune-up.

Children's programming. Whether it's an educational program or a Saturday-morning feature, virtual-set imagery can captivate children of all ages. In this type of application, virtual sets can achieve their creative peak by building environments for teachers and educators where anything is possible.

Real-time special effects. Once a virtual set has been designed, unique special effects are almost free. Kiosks can rise from the ground or float from the sky. TV screens can float in midair, with on-air talent in the foreground or background. Lines of text can fly in and encircle the talent. Walls can move; the ceiling can vanish to reveal a midnight sky; the floor can morph from brick to wood to marble, all in the blink of an eye.

These applications merely scratch the surface of virtual-set capabilities. The creative possibilities and cost-benefits of this rapidly evolving technology deserve more exploration.

Expect virtual sets to increasingly become an integral part of broadcast and video production. The speed with which this exciting technology is adopted will hinge on three factors: cost, reliability and ease of use. ■

David A. Tubbs manages video strategies for Evans & Sutherland Computer Corporation and is a member of the Cybercast Committee, Academy of Television Arts and Sciences.

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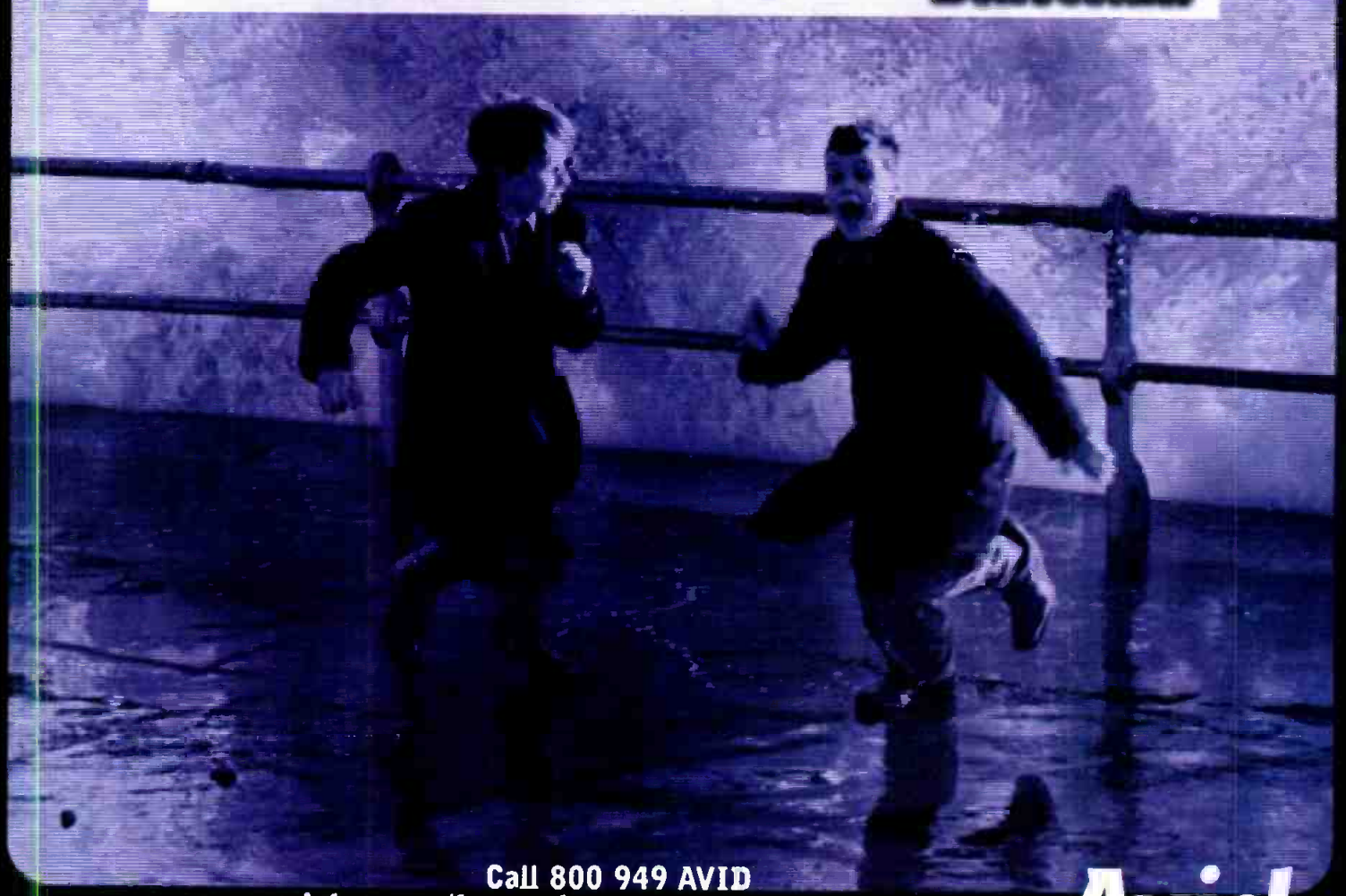

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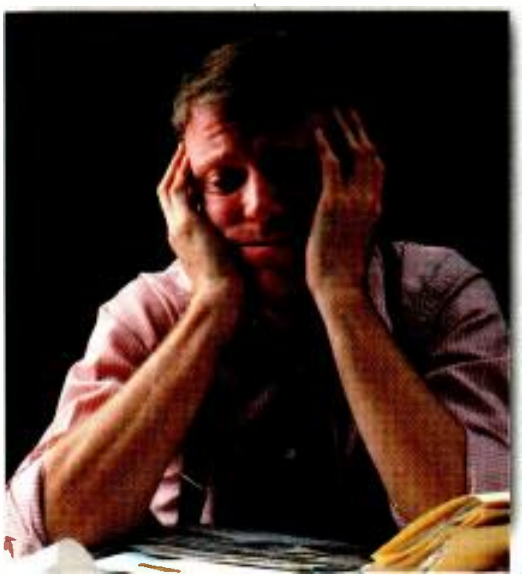
Fear as friend, worry as worthless

BY KARE ANDERSON

"Man's fears are fashioned out of the ways in which he perceives the world." These are the words of Gavin De Becker, an expert on fear and violence.

Animals know what to fear by instinct but, according to De Becker, humans have no instinct and thus have no pro-



grammed fears. Some believe the news has helped program our fears, with newscasts that practically burst into our homes and cry, "Don't go outside or you will be killed!"

We do live in a society with a higher rate of violence than most. What can you do in the face of such violence? You can learn how to recognize when someone's hostility or other, less apparently dangerous, actions really pose a threat. This skill will help you act when you need to protect yourself and will keep you from letting unfounded fear and worry contaminate your life.

There is nothing to fear unless and until you feel fear. Following this advice will help you determine when you need to protect yourself. Whenever you've felt profound fear, it has probably been linked to the presence of danger, imminent pain or death. When we feel fear, our intuition makes connections: We "link" the fear back to a past situation in which the felt afraid.

Surveys have ranked people's fear of public speaking close to their fear of death. Why would people have the same churning stomach and rapid heartbeat from an event so far removed from death? Those who fear public speaking actually fear the loss of inclusion that correlates with performing badly. We instinctively make the link between these events: If we perform badly, we will be embarrassed, shown to be incompetent and unworthy, and will thus be excluded from the community needed for comfort and for survival.

Fear means something might happen

When you feel afraid, try to find the links to other events, then see if you need to take action. You may realize that your fear is linked to something irrational, and that knowledge can help you get over your fear.

In contrast, you may realize that your fears are rational, and you may need to trust your feelings.

Worry is the fear we manufacture

Any time a dreaded outcome cannot be linked to pain or death and isn't a signal in the presence of danger, it should not be confused with fear. Worry will not bring solutions and, in fact, will distract you from finding them. Worry is a form of self-harassment.

To help free yourself from worry, you need to understand what it really is. Most people worry because it provides some secondary reward, such as enabling us to avoid change, to avoid admitting powerlessness, allowing us to feel a sense of connection with others, and giving us a sense of protection against future disappointment.

The connection between fear and worry is similar to the relationship between pain and suffering. Pain and fear are necessary and valuable parts of life. Suffering and worry are destructive and unnecessary parts of life. Worry interrupts clear thinking, wastes time and can shorten your life.

We choke on anxiety

The word anxiety stems from a root that means "to choke," and that is just what anxiety does to us.

Anxiety is always caused by uncertainty. You can reduce your anxiety by improving your predictions, thus increasing your certainty. If you know you are going to be fired, you can prepare by accepting and adjusting to this situation. If, on the other hand, you merely think you are going to be fired, you will needlessly suffer (and your work performance may suffer as a result).

Our imaginations can be fertile soil in which worry and anxiety grow from seeds to weeds, but when we assume the imagined outcome is a sure thing, we are in conflict with what Proust called an inexorable law: "Only that which is absent can be imagined." In other words, what you imagine — just like what you fear — is not really happening. ■

Tips on managing worry and fear

1. When you feel fear, listen to the feeling.
2. When you are worried about something, explore the feeling and discover its origins.
3. When you don't feel fear, don't manufacture it.

Adapted from Gavin De Becker's book, "The Gift of Fear: Survival Signals that Protect Us from Violence."

Kare Anderson is a speaker and author. To get a free subscription to Kare's on-line newsletter, Say It Better, *sign up at her web site www.sayitbetter.com.*

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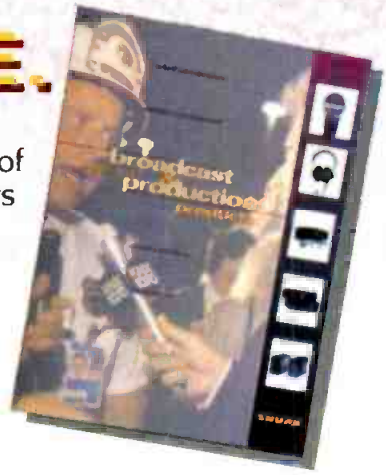

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Applied Technology

On-screen monitoring: A new paradigm

BY MARK EVERETT

The Videotek VTM-200 family of multiformat on-screen monitors originated during a meeting between Videotek designers and a major network to discuss the creation of a CRT-based 601 scope.

This particular network wanted one display for every four tape machines and displays for use in graphics and editing/production areas as well as master locations.

Videotek designed the original 601 CRT-based scope with limited functions because many users today aren't engineers and thus don't need the detailed, esoteric functions found in lab scopes. The goal was to create a display that would convey information in a simple, clear and sharp manner. Raster-type displays were dismissed because the waveform, vector and audio displays obstructed the view of the picture and because the resolution of the waveform and vector displays was not sufficient for most applications.

After talking with users, an SVGA-type display was selected. Reducing the size of the picture and using an 800x600 display provided nearly full resolution of NTSC in a quarter screen. In addition, the SVGA's progressive-scan format doubles the resolution of the waveform and vector displays. The resulting design displays four quadrants — picture, waveform, vector and audio. Numerous display options also exist.

Users suggested incorporating a computer keyboard as an input device. Using a 16x1 monitor/keyboard switcher, users can select between the VTM-200, a traffic computer, or a computer-based character generator. Users also recommended including CAV inputs, which provided an unobtrusive method to switch one SVGA monitor between an Avid display and a VTM-200 display.

The new monitor incorporates a screen-print function. Screen prints are a simple way to capture the picture, waveform, vector and audio for multiple uses, including proof of delivery, proof of airing, QA for duplicators, QA for manufacturers, transmission-link tests, proofs and system verification.

Videotek VTM-200 family of multiformat on-screen monitors.

The SVGA output of a computer is analog RGB. Processing in the VTM-200 is such that the only place all of the display parts come together in the unit is in an analog state, ready for output to the display. An external box, the FG-200, intercepts the SVGA analog output, digitizes and stores the data, and passes the analog on to the picture monitor. A second output of the FC-200 is a dataport to send the 800x600 pixels by 24 bits of data off to a computer for storage and printing.

While stereo audio is sufficient today, six or eight channels of audio also had to be addressed because they will be a necessity in the near future. The means for displaying the audio will have to be adapted to fit 5.1 channels of audio as well as other applications. The VTM-200 system is currently flexible enough to handle NTSC-encoded, PAL-encoded, 525/60 and 625/50 versions of 601 as well as CAV video in various formats. Models capable of 480p, 720p and 1080i will be available.

More than 200 graticules are stored internally to help the user view the display in a comfortable format. These graticules map to different audio needs and regional requirements. There are three versions of IEC audio scaling, a version for Nordic countries, a digital scale and other custom user scales. The ballistics are alterable, and the zero reference is variable. Marking versions, which show waveform increments in units (IRE and mV) have been included. The screen-based display presents the information without the clutter of unnecessary markings. The advantages of software-generated graticules are that they can be changed and that additional graticules can be developed to meet specific user needs.

The Videotek VTM-200 is an SVGA-based display flexible enough to adapt to any video format. Aspect ratio, line rates and field rates can all be addressed in the SVGA-style display, and the reduced cost of the display and the support equipment work to provide better solutions at a lower total cost to the user. ■

Mark Everett is vice president of product development at Videotek, Pottstown, PA.

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Editing technology

BY THE BE STAFF

Editing systems have come a long way from the Editec systems found on the early Quads. Today's systems are microprocessor-based and feature numerous bells and whistles. Though the introduction of non-linear systems earlier in the decade has changed many of the basic workflow parameters, one thing hasn't changed: The purpose of an editing system is to assemble a final product, typically a program or commercial. This can be done in a linear or non-linear fashion.

Despite all the hoopla surrounding non-linear systems, linear suites remain in active use. One post house in the Hollywood area planned on replacing one or two of its linear suites with non-linear suites this year. Instead, it has decided to do some upgrades in those rooms and leave them in a linear configuration. The suites work well and perform reliably—there was no compelling reason to change. At the other end of the scale, many new or smaller facilities find non-linear systems highly efficient for their needs, and have no interest in building or maintaining a linear suite.

When considering an editing system, a number of parameters come into play. One is the number of video sources available. To a great extent this will determine the sophistication of the final production. Within a non-linear system the sources are based on the tracks. For linear systems the limit is based on the number of machines that can be controlled simultaneously. Within hybrid systems, the total depends on the system architecture. The same thing comes into play where audio is concerned. Some systems allow numerous audio tracks within the editing environment, but require all the tracks to be mixed down to typically only two or four when outputting the project

Scitex StrataSphere

Panasonic Newsbyte

Most systems provide the capability to undo edits, but the number of undo levels provided varies. Nearly all of today's non-linear systems provide video switcher and DVE capabilities. The sophistication and quality of these vary, and should be checked carefully to verify that they meet your expectations as well as those of your clients.

JVC TimeGate MW-S1000

Another thing to consider is the use of compression. Compression is integral to much of today's equipment—not just editing systems. Concatenating compression systems can cause serious signal degradation. To avoid unnecessary distortions, the editing system's compression algorithm should be consistent with the rest of the signal chain. Many of today's editing systems use the same algorithms that are used in acquisition and storage devices. When handled properly, moving signals from storage to edit and back, causes minimal signal degradation.

Also consider how the unit interfaces with existing and, to some extent, future equipment within the facility. GPI triggers and serial interfaces are always helpful, as they can be put to a variety of uses. Unfortunately, for the more creative types, there are never enough of these to provide all the extras desired.

Sony DNE-1000

Finally, consider your operations staff. Which system or system typewill they be most comfortable with? Which system will provide the most efficient work flow? Are things like operator training included in the package? Will training be on-site or will travel be required?

With all of today's sources for audio and video, flexibility is a key component of many systems. The ability to interface with a variety of equipment and/or the capability to input/output a variety of signal/file formats can be extremely helpful in nearly all editing environments. The following table lists some key parameters and features to consider when buying an editing system.

This data was provided by companies that responded to our request for product information. ■

MPEG2 DBE 4100 ENCODER

Thomson Chipset

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The DBE 4100 Encoder really sets the standard and will perfectly assist your move to DTV. Combined with the Thomson High Quality Professional MPEG2 442P/MP@ML Decoder 4400 series, it offers an outstanding video quality in a reduced bandwidth.

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Tel: (770) 977-8980

or

(800) 882-1824
http://www.thomsonbroad.com
e-mail: mpeg@thomsonbroad.com

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THE BIG PICTURE

Company	Model #	System type	Platform	# of video input channels	Max # of video channels/deck	# and type of video output channels	# and type of audio input	Max # of audio channels	# and type of audio output channels	Levels of undo	Video switcher/keyers	DVEs	Character generator	# and type of external interfaces
Accom 650-328-3818 info@accom.com #450	Axial 3000	Hybrid	Proprie-tary	N/A	24	N/A	N/A	4	N/A	1	RS422	RS422	RS422	Unlimited, through spec files
Avid 978-640-6789 www.avid.com #451	Avid Symphony	Non-linear	Windows NT	2; ITU-R 601 serial digital, analog composite, component, S-video	24 video tracks (more if tracks are nested)	1; serial digital, analog composite, component, S-video	8; AES/EBU and SPDIF	24 audio tracks for editing and mixing		32	No switcher; real-time chroma, luma keys; non-destructive compositing on unlimited layers	Yes	Real-time title tool available	N/A
Digital Processing Systems (DPS) 800-775-3314 www.dps.com #455	Perception RT3DX	Non-linear	Windows NT	1 input channel; composite, component and Y/C inputs are standard. SDI (D1) and DV (IEEE-1394) inputs optional	2 full bandwidth video streams can be played in real time; hardware accelerated rendering	2 output channels are standard; composite, component and Y/C outputs with optional SDI and/or DV outputs; Y/C	2	2 physical audio I/O channels but unlimited number of audio tracks on timeline	2 (stereo pair)	Unlimited	Over 450 real-time 3-D and 2-D effects available; dual video graphics/key buffers for real-time CG effects	Includes DPS R3DX real-time DVE with 5 layers of video	Inscriber CG RT plug-in included provides full-featured CG functions including real-time roll and crawl	The RBX2+ A/V breakout box is a standard accessory
DraCo Systems 303-440-5311 www.draco.com #456	Casablanca	Non-linear	Proprie-tary	2; Y/C, composite, IEEE 1394, DV	Unlimited channels	2 Y/C, composite, IEEE 1394, DV	2	Unlimited	2 (stereo pair)	10	Chroma key	Yes	Yes	Trackball/mouse, keyboard
Editing Technologies 818-840-1101 www.etcedit.com #457	Ensemble Gold	Non-linear hybrid	PC	4; SDI, component, composite	4	4 or more (hardware dependent)	4 analog or digital per channel of video	16	4 analog or digital per channel of video	99	422 serial SW control and direct serial control or GPI also Profile ME card	Serial or GPI	Serial or GPI	All major VTRs, VDRs, SW and mixers
Editware 530-477-4300 www.editware.com #458	VPE-351 with Profile NLE option	Hybrid	Proprie-tary	Depends on switcher (Profile - SDI, NTSC/PAL, MPEG or M-JPEG)	13 connected; 7 simul-taneously	Depends on video switcher (4 with Profile)	Depends on mixer (16 with Profile)	Depends on mixer (16 with Profile)	Depends on mixer (4 normal); AES/EBU and analog	1	VME- A/B with dissolves, wipes, key	Depends on system, but many supported	Many supported with dedicated port	Over 100 different protocols
Fast Multimedia US 800-2489-3278 www.fastmultimedia.com #459	601	Non-linear	PC	Dual stream/real time = CVBS, Y/C, SDI, YUV, DV, DVCAM	Unlimited	IPB, DVD I/O	8; AES/EBU	Unlimited	2; digital and i.link	Unlimited	1 real-time graphics channel; 2 SG bit alpha channel	Real time	601-CG	SDI, DVD, i.link
Incite +41 22 308 57 57 imc@inciteonline.com #460	Basic Incite	Non-linear	PC; Windows NT	1 input, 3 types: SDI (option), component, composite	Unlimited (with 2 video, 1 graphic layer in real time. "Live video input" provides a third layer of real-time video)	2 (program & preview key total outputs: SDI (option), component, Y/C, composite	4 analog inputs; 2 digital inputs	Unlimited (with 8 real-time channels)	4 analog; 2 digital	Unlimited	Real time; 2 layers video keying; DigiMix board	Real time 2-D DVE and optional 3-D DVE over the standard 2 video channels and 1 graphic channel	Inscriber CG	Limited number of external interfaces with integrated editing features
JVC Professional Products 800-582-5825 www.jvcpro.com #461	MW-S1000 TimeGate	Non-linear	PC	1; component, composite, Y/C, SDI	1-2 decks	Component, composite, Y/C, SDI	4x4; 4 analog; 4 AES/EBU	8 mixdown; 4 output	4 output	36	GUI	1 2-D; 1 3-D	Inscriber CG	Control panel

CONTINUED ON P. 102

Extron Gives You 32 x 32 Reasons to Switch

Extron is now shipping the highly anticipated **3200 Series Matrix Switchers**. With 32 inputs and 32 outputs it seems reason enough to choose the matrix router that offers serious performance and reliability. The 3200 Series provides routing for RGsB, RGBS, RGBHV, composite video, S-Video, component video and audio. It delivers 230 MHz (-3 dB) video bandwidth, even when fully loaded and the intuitive front panel controller makes this switcher easy to operate. The 3200 also provides modular flexibility that will accommodate your system long after the initial installation. With internal busing card slots you can expand the router through the front panel without disconnecting any existing cables.

Need more reasons to switch? Extron provides 24-hour technical support 7 days a week. Whether you need technical information, system design assistance or product information, Extron's technical support representatives are ready to respond to your needs. We also offer customer training, educational literature and more.

The 3200 Series features:

- 32 x 32 matrix
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- Wideband, low res., sync and audio models
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- RS-232 with Extron's own SIS™ (Simple Instruction Set)
- Rooming to organize and simplify presets
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- Audio breakaway
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- Optional MKP 1000 remote keypads and input and preset selections

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Media 100 508-303-4781 www.media100.com #462	Finish v80	Non-linear	PC	3; DV option	2 real-time tracks and 1 graphics/track	4; composite, S-video, component, DV	2	8; real-time crossfades	2	1	N/A	50-plus expandable via plug-ins	Built-in	Finish software
Mina Systems 800-483-6462 www.minasystems.com #463	Mina RT	Nonlinear	PC	1	1	1; all types	2	2	2	32	Yes	Yes	Yes	Breakout box
Panasonic Broadcast & Digital Systems Company 800-528-8601 www.panasonic.com/pbds #464	NewsByte	Nonlinear	Windows NT	3, component, composite with DVCPRO	2	3	2	6 mono tracks	2	16	Yes	Yes; 2-D	Yes; true type	Optional control panel
Philips Digital Video Systems 800-962-4287 www.broadcast.philips.com #465	NewsBreaker	Non-linear	Windows NT	User specified; system is networked; each workstation can capture audio and video	User specified; system allows for up to 100 workstations per server	Two video outputs per workstation, component and composite	2	4 virtual editing channels per station	2 channels analog	Unlimited	Cuts only	None currently; 2 levels of effects will be available		
Pinnacle Systems 650-526-1600 www.pinanaclesys.com #466	ReelTime; ReelTime NITRO	Non-linear	PC	1; component, composite, S-video	99	2; plus 1 superimpose for real-time playback	2	99	6 or more		Chroma, luma, linear keyers	425 pre-defined	TitleDeko	
Quantel 800-218-0051 www.quantel.com #467	Editbox Platinum	Non-linear on-line	Proprie-tary	3; SDI, 1 analog component	N/A	4; SDI, 1 analog component	2; AES/EBU stereo digital plus 4 channel embedded audio	8 stereo pairs	2 AES/EBU stereo digital plus 4 channel embedded audio on each output	Unlimited	Built-in via mix/Fx	Built-in via mix/Fx	External via GPI; internal via Paintbox	100Mb/s Ethernet connection; 3 RS-422 VTR control ports; diagnostic ports; printer ports; 1 GPI remote trigger port
Scitex 888-846-7017 www.scitexdv.com #468	StrataSphere	Non-linear	Mac	4 composite, S-video, component, serial digital	3 real-time channels (2 video, 1 title)	4 composite, S-video, component, serial digital	2	4 real-time stereo pairs	2	1, plus unity	Yes	Yes	Yes	N/A
Sony Electronics 800-635-7669 www.sony.com/professional #469	DNE-1000 Digital Editing Workstation System	Non-linear	PC	4 SDI (expandable to 8 with optional BKNE-1030)	8	3 SDI	8; imbedded SDI, 2 AES/EBU	12	4 channel, 2 channel monitor, 2 channel AES/EBU out	16	Internal with real-time effects, 2 keyers	325 DME patterns	Via external CG	VTRs, Router, DAT and Sony New Servers
#472	ES-7	Hybrid	PC	2	2 source VTRs; 1 record VTR	1; composite, component, Y/C standard; SDI and SDTI optional	4 channels (XLR inputs) x 3, plus 1 XLR stereo pair, plus AES/EBU	8	4; XLR	8	Real-time 4:2:2 switcher with 8-bit DSK (alpha keyer), plus 8-bit chroma keyer and luminance keyer	User pro-gramm-able real-time DVE with over 400 curvilinear 3-D effects	ES-Draw	4 RS-422; 2 GPIs; optional: 2 SDTI (QSDI) inputs; SDTI (QSDI) output
United Media 714-777-4510 www.unitedmediainc.com #474	On-Line Express	Non-linear	Windows NT	Dual Stream System supports any format I/O	Unlimited	Dual stream system supports any format I/O	4 audio I/O	8	4; 48KHz CD-quality	Unlimited	Internal real time	Unlimited real- time 2-D DVES; optional 3-D DVE plug-ins	Bundled for real-time titles	Optional real-time 3-D DWE
Videomedia 800-937-8526 www.videomedia.com #475	O2-PCE	Linear	PC	8 (switcher dependent)	8	4 (switcher dependent)	16 (mixer depen-dent)	4	4	50	All via V-LAN	All via V-LAN	All via V-LAN	Up to 31 devices per V-LAN

Table 1. Editing equipment specifications. Information based on manufacturer-provided sources.

Digital TV is hot stuff. And getting hotter every day. See what's new and what's coming in digital TV at the Consumer Electronics Show, the world's largest and most comprehensive consumer technology event. Whether your thing is digital TV or something else, don't miss this one.

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MPEG-2 DSNG encoder

Tiernan Communications TE600: a flexible TV broadcast encoder with a built-in QPSK satellite modulator supporting both 4:2:2 and 4:2:0 profiles according to the MPEG-2 standard ISO/IEC 13818-2; features an illuminated LCD status and control panel with push-button controls; available with a remote-control function (using ASCII commands) via the EIA-232 remote-control port; the front panel has new, quick set-up features that allow frequency and satellite parameters to be preset at the base of operations; designed to handle the processing of a broad range of video and audio signals in a wide range of applications; MPEG/DVD compliant; 619-587-0252; fax 619-587-0257; www.tiernan.com

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Broadband rigid transmission line

Andrew WIDELine: a unique patented bellows section in each inner conductor compensates for differential expansion between the inner and outer conductors; eliminates mechanical wear from sliding; made of sections of different lengths to minimize addition of reflections, giving a maximum VSWR performance of 1:1:1 overall UHF channels in the FCC core spectrum; available in 3 1/8 inch 50Ω, 6 1/8 inch 75Ω and 8 3/16 inch 75Ω; if full wideband performance is not required, Andrew will calculate the optimum rigid line/section length to minimize VSWR; 800-342-5479; fax 708-349-5220; www.andrew.com

Circle (260) on Free Info Card

Digital multitrack recorder

Yamaha D24: based on 3.5-inch magneto-optical disks; offers 16-, 20-, 24-bit, 8-track simultaneous record and play capability at 44.1 and 48kHz sampling rates, and 4-track record/play at 96kHz; offers modularity, the benefits of non-linear editing and removable media; up to eight units can be synchronized to create large recording systems; 714-522-9011; fax 714-739-2680; www.yamaha.com

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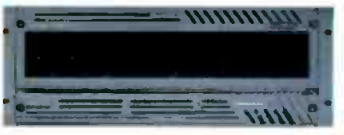
comprehensive control flexible solution



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Analog Video Distribution Amplifiers
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Audio/Video Monitoring Amplifiers

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Vela Broadcast RapidAccess distributed video server: combines encoding capabilities, control software and compatibility with off-the-shelf disk storage; records, stores and plays back audio and video using MPEG-2 compression; a relational database handles all content management, playlist management and hardware asset management; the system's encoding hardware creates a fully compliant, broadcast-quality MPEG-2 (4:2:0 or 4:2:2) stream in real time, which can be played back immediately after recording on any of the playback channels; 813-572-1230; fax 813-573-2508; www.vela.com

Circle (261) on Free Info Card

Digital audio console software

Sony Electronics OXF-R3 software version 1.2: enhances the Oxford's multiformat functionality and automation capabilities; features include the addition of motorized joysticks as standard equipment, enhanced multiformat panning and assignment capability, expanded multiformat monitor/speaker calibration settings, and a multiformat master fader; provides full automation of all useful controls and new off-line automation features; new channel-based I/O screens; new GUI-based link functions and a new EQ section on the main stereo output; 800-686-SONY; fax 201-358-4058; www.sony.com/professional

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Digital mixer enhancements

Panasonic DA7 digital mixer enhancements: *A new analog plug-in card* facilitates seamless integration of digital and analog signals into a 24-bit digital mixer; offers DA/-A/D dynamic range of 100dB and an analog I/O dynamic range of 97dB at a sampling frequency of 44.1kHz/48kHz; the card's A/D converter offers an input spec of 20-bit at 64 times oversampling; the D/A converter offers an output spec of 20-bit at 128 times oversampling. *Version 1.1 software* gives the DA7 the capability to send and receive MIDI communication messages in real time; the upgrade allows flattening of an entire EQ setting by holding down the EQ band key, enabling quicker creation of EQ settings; the version will be available at no charge to current DA7 owners and can be downloaded from the company's web site or ordered through authorized Panasonic DA7 dealers.

MAX expansion software package allows the incorporation of a Macintosh into any recording environment using a Panasonic DA7 digital mixer; key features include the custom-views section, the cue list and the graphics editing section; custom views shows current DA7 fader, knob and switch positions reflected both on the computer and mixer via MIDI in real time; the cue list shows each automation move as an event occurring at a specific SMPTE time; in the cue list, individual fader moves to whole sections of a mix cue can be copies, cut, pasted and modified as desired; Windows versions will be available in January; 800-528-8601; fax 323-436-3615; www.panasonic.com/PBDS

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When you move up to 4:2:2 compliant digital, do it with someone you trust.

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New software for video workstations

Scitex Digital Video Sphere version 3 software for the StrataSphere, VideoSphere and DigiSphere workstations: features include the clipsheet project organizer with sort, find and a media file locator; an audio waveform level indication with enhanced digital scrub on clipsheets and tracksheets; drag and drop between and within clipsheets and tracksheets; project archiving with AIT data tapes; autosave with user-specified parameters; keyboard-command mapping to customize the user interface; 999-event multilayer undo to complement the unity undo feature; 888-846-7017; fax 650-599-4777; www.scitexdv.com

Circle (266) on Free Info Card

Digital ENG camera lenses

Fujinon Broadcast & Communications Products Division A19X8.7 and A19X6.5: professional-grade lenses designed for ⅔-inch format and ½-inch format cameras, respectively; employ inner focus, which keeps focusing and filter setting independent; the lenses also employ Fujinon's QuickZoom feature, which allows the operator to frame a shot, zoom in to focus, then automatically zoom back out to the original shot at the touch of a button; the lenses incorporate Fujinon's aspheric technology, which increases many areas of optical performance while reducing lens size and weight; maximum aperture of F1.8 from 9mm to 162mm, a minimum object distance of 0.9m, and weight of 2.6 pounds; available with or without a 2X range extender; 800-633-5600; fax 973-533-5216

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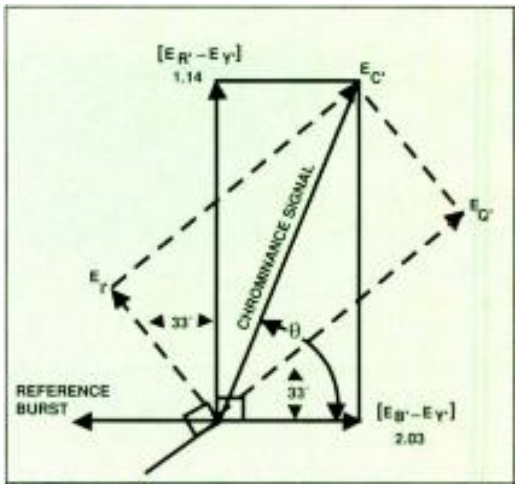
Their specs.

Our specs.



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The **msi 320** delivers performance comparable to the legendary 1450* at a price thousands of dollars less than you would expect to pay. That's because it's based on an original design by Modulation Sciences that maximizes use of advanced integrated circuits and other parts intended for DTV, and minimizes use of expensive custom-engineered components. An easy to use, dual function, knob is the only front panel control on the **msi 320**, and its 2-line, 40-character display is easy to read in any light condition. It has only 8 internal adjustments, so calibration is easy and inexpensive. It also includes a Nyquist SAW filter, selectable line zero-carrier reference, synchronous video detection, continuous all-channel tuning and a host of other advanced features you would expect to find only on much higher-priced demods.

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*1450 is a mark of Tektronix, Inc.

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Serial digital monitor

Magni SD1: designed to be used as a stand-alone serial digital monitor or in conjunction with Magni's AVM-510 family of automated, live-video signal monitors; a key feature of the SDI is its ability to measure eye pattern, gamut, jitter, EDH and signal amplitude errors, and to display them over the video picture, which enables the operator to monitor picture content, the legal color limit and the overall quality of a digital signal; provides a re-clocked serial digital output and decodes the serial digital input to analog output in composite, S-video or component format; it also decodes the embedded serial digital audio to two AES digital outputs and provides four channels of analog audio for display and aural monitoring; 800-237-5964; fax 503-615-1999; www.magnisystems.com

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Handheld e-mail and fax device

JVC HC-E100 PocketMail: a handheld personal communication device that sends and receives messages reliably, regardless of geographic location; gives broadcast professionals an affordable, easy-to-use solution for maintaining communications; fully capable of sending faxes and text messages to any e-mail-enabled pager; incorporates PocketMail technology and uses PocketMail mobile e-mail service; works with almost any telephone connection, including cellular, pay phones, office and hotel PBXs; no special connectors, modems or hardware configurations needed for sending and receiving messages; the user simply dials an 800 number, holds the device against the telephone handset and pushes the PocketMail button; stores up to 128k of information, including messages composed of up to 4,000 characters; 973-315-5000; fax 973-315-5030; www.jvc.com

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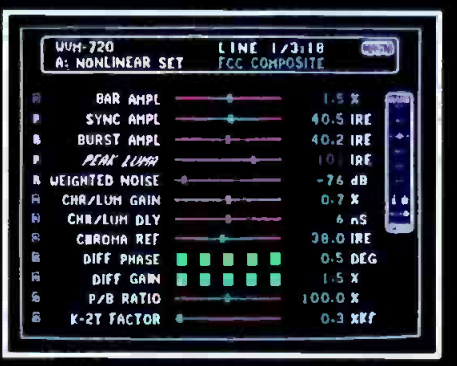
Extent and nature of circulation:

	Average No. copies each issue during preceding 12 months	Single issue nearest to filing date
A. Total No. copies printed (Net press run)	37,310	37,744
B. Paid and/or requested circulation		
1. Sales through dealers and carriers, street vendors and counter sales	0	0
2. Mail subscriptions	32,818	33,364
C. Total paid and/or requested circulation	32,818	33,364
D. Free distribution by mail (samples, complimentary and other free)	2,622	2,620
E. Free distribution outside the mail (carriers or other means)	663	400
F. Total free distribution (Sum of D and E)	3,285	3,020
G. Total distribution (Sum of C and F)	36,103	36,384
H. Copies not distributed		
1. Office use, leftovers, spoiled	1,207	1,360
2. Returns from news agents	0	0
I. Total (Sum of G, H1 and H2)	37,310	37,744
Percent paid and/or requested circulation (C/G x 100)	90.9%	91.7%

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including multiple damages and civil penalties).

Dennis Triola,
Publisher

Video Transmission Monitoring Without Compromise



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Magni's AVM-510 does it all. For attended operation you can simultaneously view video, audio levels, waveform and vector displays. The nonlinear and depth of modulation measurements, including diff phase, diff gain and signal-to-noise, let you continuously monitor critical signal parameters.

For proof of performance, time stamped/coded measurement results can be sent to a printer or a PC file.

When you require unattended operation, Magni's Logbook II software lets you remotely control the AVM-510 from any PC – you can even dial in from home. The AVM-510 will work for you 24 hours a day, 7 days a week.

If your plans include upgrading to serial digital, the AVM-510 can serve as a platform in Magni's Serial Digital measurement system.

AVM 510 Automated Video Monitor

MAGNI®

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Circle (57) on Free Info Card

Digital multitrack recorder

Otari RADAR II HDR Series: this second-generation enhancement of the hard-disk multitrack recording system, RADAR I, is a stand-alone 24-bit, 48kHz sampling, 24-track hard-disk recorder; features a standard 9GB removable hard drive and an all-new remote-control console that emulates the operation and feel of a remote-controlled analog tape recorder; features a detachable remote meter bridge so RADAR II can be located away from the control room; an optional T/DIF link with 24-track digital I/Os allows RADAR II to communicate directly with digital consoles; fully compatible with RADAR I via user-selectable 16 or 24-bit operation; 48-bit resolution provides up to 42 minutes of track recording; 800-877-0577; fax 818-594-7208; www.otari.com

Circle (272) on Free Info Card

Compact disk recorder

TASCAM CD-RW5000: reads and writes to all currently available media, including CD, CD-R, CD-RW, CD-R-DA and CD-RW-DA; 2U rack mountable; key features include XLR balanced and RCA unbalanced analog I/O, an AES/EBU digital input, S/PDIF coaxial and optical digital I/O, a sync start function, auto or manual track increment capability, a sample rate converter, and parallel control I/O capability; 213-726-0303; fax 213-727-7635; www.tascam.com

Circle (273) on Free Info Card

High-resolution 24-bit DAT recorder

TASCAM DA-45HR: records true 24-bit audio data on a standard DAT tape; 3U rack mountable; features XLR balanced and RCA unbalanced analog I/O, AES/EBU and S/PDIF digital I/O, Word Sync I/O and parallel interface; the interface takes advantage of proven hardware design, with an entirely new software architecture; the menu-driven environment features a comprehensive display that promotes intuitive operation with easy access to its numerous system parameters, including auto ID, copy ID select, reference level setting, record, mute and repeat functions; has two recording modes; while operating in 24-bit high-resolution mode, a standard 120-minute DAT tape yields 60 minutes of recording time; in 16-bit standard mode, the tape will yield two hours or recording time; sampling frequencies include 44.1 and 48Hz; 213-726-0303; fax 213-727-7635; www.tascam.com

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Digital audio disk recorder

Sony DADR-5000: a digital replacement for analog mag film dubbers and a 16-channel recorder for selectable 16-, 20- or 24-bit uncompressed digital processing; designed to operate in a standalone configuration or a network system; offers non-linear, hard-disk operation with all standard frame and sample rates, continuous audio output in forward or reverse play from stop to 1.5X speed and audio input; off-line editing enables individual tracks to be edited through a network or by removing the media and working on another DADR-5000; comprehensive synchronization modes include the ability to lock to biphase, video sync, wordlock, SMPTE/EBU, LTC, VITC and Sony 9-pin protocols; 800-686-SONY; fax 201-358-4107; fax 201-930-4752; www.sony.com/news

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Now Shipping

Desktop video editing system with 3-D special effects

Pinnace Systems RealTime Nitro: a real-time, full-screen, full-motion, dual-stream non-linear editing system with 2-D and 3-D digital video effects (DVE); designed for the Windows NT environment, features include real-time scrubbing, picture-in-picture effects, 3-D axis placement and smooth 3-D rotation; 888-484-3366; fax 650-526-1600; www.pinnaclesys.com/companyinfo.html

Circle (275) on Free Info Card

Digital console

Otari ADVANTA: a state-of-the-art, large format digital mixing system offered in application-specific configurations for the music recording, on-air broadcast, film and post-production industries; accommodates up to 256 full-function channel paths; three operator positions are available for film and video-post applications; users can select a combination of dedicated or mapped control elements for the assignable control surface; 650-341-5900; fax 650-341-7200; www.otari.com

Circle (276) on Free Info Card

HDTV encoder

Lucent Digital Video FlexiCoder: an MPEG-2 encoder that allows broadcasters to migrate from standard-definition to high-definition video with the addition of a single video module; delivers pictures in 1080i or 720p and supports Advanced Television Systems Committee compliant multichannel audio; 888-4LUCENT; fax 908-582-3662; www.lucent.com/ldv

Circle (277) on Free Info Card

New CG platform

Pinnacle Systems FXDeko: 100% BroadNet compliant, the new CG platform FXDeko provides render-free effect, looks and character animations in 3-D space for real-time, live and on-air broadcasts; the design features 10-bit, 4:4:4:4 operation for a high level of effects performance, key output and video quality; FXDeko is resolution independent and supports a variety of video formats, including digital TV formats, NTSL, PAL, 16:9 and 4:3; for facility integration; 888-484-3366; fax 650-526-1600; www.pinnaclesys.com/companyinfo.html

Circle (278) on Free Info Card

Business

The HD-1, National Mobile Television's all-digital, high-definition mobile truck, uses 10 Fujinon lenses —

seven 66X and three 20X — with Sony HDC-700 and HDC-750 high-definition video cameras. In a shootout Madison Square Garden conducted, the lenses exhibited the best image quality. The HD-1 was first used at a National Hockey League game between the New York Rangers and the Philadelphia Flyers, which was broadcast on the MSG network in the 1080i digital standard.

TCI Media Services of the Monterey Bay, the advertising arm of the TCI Pacific West Division, has selected JVC's 4:2:2 component DIGITAL-S as its in-house editing format. Archiving raw footage economically was a consideration in moving to the digital format. The package included a BR-D85 recorder with pre-read, two BR-D750 editors and a BR-D40 recorder that docks to an Ikegami HL-45 camera for field use. To create effects, the BR-D85 is run through a Pinnacle 601 Aladdin.

Philips Digital Video Systems has delivered the CleverCast PC data broadcasting system to PICKSat, thus facilitating PICKSat's debut of a high-speed multimedia delivery platform over satellite. The system includes a fully redundant IP-DVB Gateway system and PC-DVB digital receiver cards, which are designed to fit into any multimedia PC and integrate into PC software. The CleverCast system allows digital multimedia data to be broadcast at high speeds through digital satellite transmission systems to PCs, followed by transmission to a single user (unicast), a group of users (multicast) or to all users (broadcast). The data is only transmitted to the satellite network once. This push method saves bandwidth and reduces transmission costs.

The Armed Forces Radio & TV Service has selected the Vibrint MPression MPEG-2 4:2:2 production video server to encode digital signals of its first worldwide weather broadcast for satellite distribution to the Pacific, Atlantic and Americas regions. The broadcast allows military personnel and workers in U.S. embassies in remote areas to hear weather reports in English for military locations. MPression encodes a serial digital signal from the weather producer into broadcast-quality MPEG-2 files, which are stored on a hard drive and transmitted over a T1 network. The system has an external breakout box for digitizing the video, which prevents electrical noise from interfering in the encoding process.

Odetics has acquired International Media Integration Services Limited, a UK-based developer of video browsers for the broadcast TV and media industries. The companies have a long-standing relationship and have collaborated on numerous products for the broadcast market. The acquisition gives Odetics expertise in the development and support of integrated solutions for broadcasters.

WPDE-TV, Florence, SC, has purchased a Philips Digital Video Systems automation system for the automation processing of the local broadcast station and its LMA channel. The system comprises an MC-900 automation computer and a media manager computer, which provides media information and acts as a hot backup computer for the MC-900. The system has a multichannel traffic interface to a digital video server and a backup video server. The system also controls a router and master-control switcher.

A Philips automation system also provides the remote control of a new nationwide video distribution system offered by IBM Video Services. The service, which uses advanced digital compression, is delivered through the IBM Global Services asynchronous transfer mode (ATM) network and currently links six major U.S. cities. The system is designed to provide a terrestrial alternative to satellite distribution. The Philips WAN-based automation system transfers desired connection schedules from the IBM scheduling system and operates equipment in IBM point-of-presence centers.

OmniAmerica and Dielectric Communications, a unit of General Signal, have signed an agreement under which Dielectric will serve as an equipment supplier for OmniAmerica's broadcast project sites. Dielectric will provide radio-frequency components for digital and NTSC television and FM radio, including antennas, transmission lines, filters, combiners, diplexers, switches and dehydrators.

Snell & Wilcox will provide video and audio processing equipment for DirecTV's new Los Angeles Broadcast Center (LABC) in a deal valued at more than $2.3 million. DirecTV will purchase more than 150 MDD2000 and MDD500 digital video decoders and several hundred Kudos IQ modules, including frame synchronizers, audio digitization and delay, embedded audio inserters, and audio sub-frame routing.

CBS has chosen the Mitsubishi/Tektronix line of second-generation HDTV compression products for terrestrial transmission and return of contribu-

Coming in

• DTV Update

A behind-the-scenes look at what's happening with DTV.

–The fickle consumer. To buy or not buy?
–Format independence. Is there a winner?
–Survey of station plans

• Readers Choice Awards

***Broadcast Engineering* readers pick the hottest new products of 1998.**

December

tion programming to CBS' New York Broadcast Center. CBS will use the MH-1100EL 4:2:0 HDTV encoder at four stations that have committed to transmit HDTV this month. The full-frame encoder outputs a 4:2:2 compressed signal at up to 100Mb/s.

The Associated Press and Sony are working together to add video editing and video-server control features to ENPS, AP's electronic news-production system. Sony has developed the interface for ENPS based on the open-standard Media Object Server protocol proposed by AP and is helping AP refine and enhance that protocol.

Home & Garden Television (HGTV) has acquired a Cinebase Digital Media Management System to help manage its video, audio and still-images libraries. The system, which is to be implemented within the next 12 to 18 months, will hold an inventory of roughly 10,000 hours of existing video and audio and 20,000 still images, along with unlimited newly created media. The system will support HGTV programming and programming on the Food Network and the DIY (Do It Yourself) Network.

New River Communications, Atlanta, has purchased Panasonic DVCPRO50 equipment for acquisition and playback. The sale included an AJ-D900W camcorder and AJ-D950 VTR.

KARK-TV, an NBC affiliate in Little Rock, AK, recently purchased its 11th Azden WMS-Pro wireless microphone system. KARK-TV also has five Azden WMT-Pro handheld mics with built-in transmitters and 10 JVC KY-19 cameras with S-VHS decks equipped with Azden WMS-Pro wireless systems.

Adherent Systems has signed an OEM deal to supply DiviCom real-time digital video monitoring technology. The deal allows the functionality of Adherent's SV970 Stream View multistream real-time monitor to be integrated with the DiviCom THESYS network management system. THESYS provides complete digital video facility management in conjunction with DiviCom MPEG-2 compression systems.

Leitch's Northeast sales office has relocated to 111 Galway Place, 1st Floor, Teaneck, NJ 07666; 201-833-8083; fax: 201-833-8089; toll-free: 888-835-6424. The office houses the company's national sales headquarters; Richard Cooper, network sales; Rich Zabel, regional sales; and numerous field service engineers.

CBS has chosen NUCOMM for the manufacture, test and commissioning of its dual-channel digital microwave links (STL) to be installed at three CBS-owned stations. Each link will combine the stations' NTSC analog signal and the HDTV signal at the studio and transport them via microwave to the TV stations' NTSC and HDTV transmitters, which are located at a remote site. The TV studio will be linked to the NTSC and HDTV transmitter through a single microwave channel.

ESPN has chosen National TeleConsultants (NTC) to provide design and systems integration for a digital production facility in Bristol, CT. The digital facility will service ESPNEWS 24-hour sports news network. NTC will also design and install the digital infrastructure at ESPN to accommodate future digital facilities.

In other news, DirecTV has chosen NTC to provide baseband system design and integration services for the Los Angeles Broadcast Center (LABC).

The ISIS Group will design and manufacture more than 100 RTUs for the DirecTV Los Angeles Broadcast Center (LABC). The RTUs will provide for switching between pairs of incoming video and audio signals from satellite and fiber-optic signal feeds at the LABC. Each TRU is a multilevel 2x1 switcher, consisting of a single channel of video, four channels of audio and five general-purpose interface inputs.

Ocean Way L.A. has purchased a Sony Oxford digital console for the new 5.1 record and mix room in its Record One Studio. Another Oxford is already in operation at Ocean Way Nashville. The studio complex consists of seven music mixing/scoring rooms.

In addition, Sony's DADR-5000 digital audio disk recorders will be installed in Todd-AO's facilities around the world.

Paxson Communications has ordered Magni Systems AVM-510T automated video monitoring systems for 40 of the 87 stations in its PAX TV network. Paxson's engineering group in Clear-

water, FL, will remotely monitor transmitter signals at the 40 stations.

TASCAM has sold 39 digital dubbers to Skywalker Sound, a division of Lucas Digital Ltd. LLC. Skywalker Sound will use MMP-16 units to play back material edited on its WaveFrame and Pro Tools digital audio workstations. MMR-8 units will serve as master recorders for pre-dubs, mix stems and final mixers.

Tektronix and Avid Technology have announced the integration of the Tektronix Profile video server and the Avid NewsCutter news editing system. The integration of the systems allows material to be acquired entirely in the DVCPro format, edited and broadcast.

Enterprise Post, a division of Enterprise Studios, has expanded its AMS Neve Capricorn digital consoles on THX Stage A and in Studio M. The addition of 24 fader strips and a third AFU Control Section on the Stage A desk and 96 paths in each console gives each console 256 channel paths, allowing the company to work on large-scale movies.

NTL has secured satellite service contracts from Turner Broadcasting System (TBS) and the new Littlewoods/Granada joint-venture home shopping channel to uplink digital TV news, entertainment and home shopping channels to the first shared multiplex on the new Astra 2A satellite. The eight-year deal with TBS will see NTL supply a turnkey solution for the end-to-end distribution of three channels: CNN, the Cartoon Network and TNT. NTL will uplink Turner's new digital TV broadcasts to Astra 2A for broadcast direct-to-home across the UK from a common multiplex open to other broadcasters transmitting on the same transponder.

Philips Digital Video Systems will supply DVB/MPEG-2 compression equipment to Canal+ Nederland, the Dutch arm of one of Europe's pay-TV operators. TokenMux and SimulCrypt satellite broadcast systems were delivered for the August launch. Canal+ Nederland will use two systems uplinked in the Netherlands and one via a SDH link in Luxembourg. Philips will produce DST 5816 MPEG2-DVB compatible receivers for end-users.

The Ampex DST 712 library will provide the main near on-line storage for the London News Network (LNN). The system will allow LNN to store more than 450 hours of video.

New Century Productions, Allentown, PA, has ordered a Calrec 60-channel Q2 dual in-line analog console. The console will be installed into a 53-foot OB vehicle, NCP III TV Truck, with expanding sides in January 1999.

KSHB-TV NBC 41 in Kansas City, MO, has upgraded its audio system with an Orban Audicy VX digital audio workstation. The workstation is used by KSHB and sister station KMCI Channel 38 for full-length programs and for sweetening audio on advertisers' spots.

Cue Corp., the parent company of QTV, O'Connor Camera Support and Autocue, has acquired Data Center Management (DCM), a supplier of newsroom automation systems.

Fox Sports will use Discreet Logic's Frost broadcast graphics system and Vertigo Computer Solutions' Producer external control applications as the graphics platform for the Fox NFL Sunday show. Fox will use frost for the 1998/99 season pre-game, game break, halftime and post-game shows from Fox Sports' Los Angeles studio. The system is integrated into Fox's Central Scoring System by Vertigo's Producer application. Runtime control of the on-air and preview frost systems is provided by a Producer product called the Playout Manager.

ABC Hollywood has installed a 48-input AMX Neve Libra audio production console. The console is installed in Studio PP2 at ABC's studio facility. The room is the primary post-production room for all of ABC's TV programming and promotional programming originating from ABC's West Coast studios.

The Radio and Television News Directors Foundation (RTNDF) has announced a $200,000 grant from the Ford Foundation to launch RTNDF's News Judgment and Ethics Project. The project is intended to encourage high standards of electronic journalism and to enhance the public's confidence in the electronic news media. The three-year project features the following program elements: creating a prominent national project advisory council, sponsoring a national benchmark survey on the public's perception and news directors' opinions of the local broadcast media (year one), holding 18 regional public forums on journalism integrity, developing new training materials, including an in-newsroom ethics curriculum and example story tape to be used for newsroom discussion of ethical issues, and carrying out a second nation-

al survey on public attitudes about journalism (year three).

Gerry Pesavento, former director of sales and marketing for DiCon Fiberoptics, has formed Alloptic, a supplier of fiber-optic network products. Alloptic, which stands for all-optical networking, is a supplier of fiber-optic network equipment, including optical network switches, WDMs, fiber monitors, wavelength converters and other custom fiber-optic networking products. The company's address is 2215 Alto Court Road, Davis, CA 95616; 530-759-7865; fax 530-759-7866; info@alloptic.com; www.alloptic.com.

Encore Productions threw a celebration for the grand opening of Casino Windsor in Windsor, Ontario, Canada. The "License to Thrill" celebration included 6,000 celebrity and VIP guests and featured a water and stunt spectacular in the rotunda of the casino as well as live music, light shows, acrobats and pyrotechnics.

Digital Audio Research (DAR) has appointed Romco Trading as its distributor in Kuwait. Also, the Elixir Artistic Production & Distribution Company of Cairo, Egypt, has upgraded its existing SoundStation Gold system with DAR's Genesis operating software complemented by additional storage and processing facilities.

Keytech, S.A., a Sony Broadcast & Professional Latin America authorized reseller, donated a Sony Trinicom 5100 SuperSite system as part of a project for Argentina's National Communications Commission. The system will be used to help those stationed at the Marambio Air Force Base keep in touch with distant locations for a variety of applications. Before videoconferencing, communication with the outside world was limited to short-wave radio. Scientific, business and personal communications will now be more direct.

Stanford Telecom has gained approval for its STEL-2176 subscriber-modem modulator/demodulator chip and STEL-9257 headend demodulator assembly as fully compatible with the MCNS specification. The approval was gained through the PICS Proforma process, developed by CableLabs. The process is based on a conformance checklist of tests that must be executed to determine product performance.

DirecTV has signed commercial programming distribution agreements with 10 leading restaurant/bar chains. The restaurant chains will offer DirecTV programming in more than 500 locations nationwide. As part of the agreements, DirecTV will support the commercial establishments via marketing and advertising campaigns. The restaurants chains include Chili's, Macaroni Grill, On the Border, Hooters, El Torito, Chi-Chi's and Bertucci's.

Harris Corporation has delivered its first two high-definition ATSC MPEG-2 encoding systems. Both KGO-TV, an ABC-owned and operated station in San Francisco, and WBNS-TV, a CBS affiliate in Columbus, OH, have received Harris Flexicoders fully configured for high-definition television. Flexicoder is capable of HDTV and SDTV encoding in both interlace- and progressive-scan formats. The KGO unit will operate at 720p, and the WBNS unit will be operated at 1080i. The Flexicoder will encode all 18 ATSC formats. The Flexicoder was developed by Bell Labs, the research and development arm of Lucent Technologies, with input from Harris. The system incorporates a number of interfaces to ensure compatibility with current and future components in the evolving DTV air chain.

IMMAD ECVS has installed 390 of Tally Display Corporation's under-monitor displays as part of its SAR network monitoring system at EchoStar's Satellite Broadcast Facilities, in Cheyenne, WY. The SAR system is a multi-channel audio and video monitoring system developed and supplied by IMMAD ECVS. The system outputs various status messages to the TDC display, causing the display to change color or display format in response to the message.

People

Chyron is restructuring its sales organization supporting North and South America. Richard S. Hajdu, vice president, sales, Americas, will head a new sales organization. Bruce Levine (East) and Ryad Kahale (West) are the two area sales directors. Two new positions have been added to support broadcasters and program producers in dealing with digital systems design issues: Terry Barnum has been appointed director of business development, distribution systems; Bill Hendler has been named director of business development, DTV systems. The restructuring also includes recasting dealer agreements into a new Channel Partner Program, which provides incentives, co-op advertising, and training in digital systems sales and installation.

Tektronix, Beaverton, OR, has appointed Michael Oliveri vice president of U.S. sales and marketing within its Measurement Business Division (MBD).

Windows to the Web

www.pinnaclesys.com

Pinnacle Systems: Pinnacle Systems' broadcast products give professionals the cutting edge tools needed to create dazzling productions faster and more affordably than ever before. These innovative digital video manipulation tools perform a variety of on-air, production, and post-production functions such as the addition of special effects, image management, capture, storage, and play-out, as well as graphics and title creation.

www.sterlingcm.com

Sterling Communications International: Sterling Communications International, a full-service advertising and marketing communications agency, specializes in design and implementation of integrated communications for video, broadcast, satellite and cable products manufacturers. Our services include branding, corporate identity, marketing plans, advertisements, corporate / product brochures, collateral, direct mail promotions, annual reports, packaging, catalogs, copywriting, digital media, and more.

www.e-trim.com

eidria: e-trim is the logging and machine control package for the 3Com PalmPilot and PalmIII series of handheld devices. e-trim provides complete connectivity to most cameras and decks, including RS-422 and LANC (Control-L) devices, as well as LTC timecode feeds - all without any adapters or converters. Simply connect e-trim to your source, mark in and out times to create clips, then HotSync with any Macintosh or Windows computer and your log is ready for import into a variety of editing systems. Questions? www.e-trim.com

www.broadcastengineering.com

Broadcast Engineering: *Broadcast Engineering* is the only technology-driven online magazine in the industry. Its editorial environment delivers practical, informative articles on digital technology, systems integration, management, how-to installation, and systems and equipment maintenance. It is a package geared toward TV stations, cable/telcom, production, post-production, business TV, satellite and interactive television.

www.nova-sys.com

Nova Systems: A leading manufacturer of signal processing equipment for television broadcast, teleproduction, and industrial video applications. Nova's product line corrects, converts, and distributes video as well as audio signals.

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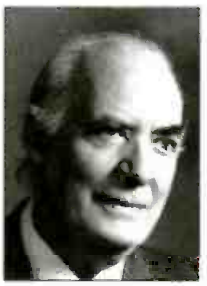
For more information on advertising in the Windows to the Web or on the *Broadcast Engineering* Web site, contact Eric Proffitt (913) 967-1860 or e-mail at the above address.

Steve Wong will be Leitch's regional sales manager for the southwestern United States. Wong will cover southern California, southern Nevada, Arizona, Utah, Wyoming and Montana.

TASCAM, Montebello, CA, has appointed **Michael McRoberts** product-planning manager.

Paul Ito will be president of Otari (U.S. operations), whose headquarters in Foster City, CA, will move to Los Angeles.

Bill Harland will be Midwestern regional sales manager for Acrodyne Industries, Ottawa, IL.



James A. Frezzolini, an inventor and pioneer in the development of professional equipment for the TV newsgathering industry, died Sept. 13 at the age of 92. Frezzolini was the founder of General Research Labs, a division of Frezzolini Electronics, and honorary chairman of the board of Frezzolini Electronics. Frezzolini developed the "Big Bertha" sports camera, portable camera lighting, 16mm sound-on-film news cameras, power converters, rechargeable battery packs, chargers and the means to integrate these items into portable newsgathering. The Big Bertha was featured in a newsgathering exhibit at the Smithsonian Museum.

Joseph French is director of a new engineering solutions business unit at Columbine JDS, Denver. The unit will be responsible for all CJDS products in the broadcast engineering marketplace.

David Johnsrud has been appointed engineering manager of Telemetrics, Mahwah, NJ. Johnsrud will manage all phases of new product development for the camera control and robotics product line.

Peter M. Tarca has been named president and chief officer of Vibrint Technologies, Bedford, MA.

Eleven award winners were recognized Oct. 30 at the SMPTE Honors and Awards Reception on October 30, in Pasadena, CA. The recipients were **William H. Smith,** *Honorary Membership*; **Paul R. Beck, Herbert Farmer** and **Rene Villeneuve,** *The Citation for Outstanding Service*; **Sherwood Woody Omens,** *The Eastman Kodak Gold Medal*; **Peter Z. Adelstein,** *The Fuji Gold Medal Award*; **Jim Frazier,** *The John Grierson International Gold Medal*; **Ronald W. Jarvis,** *The Technicolor/Herbert T. Kalmus Gold Medal*; **Katherine Cornog,** *The SMPTE Journal Award*; **David K. Fibush,** *The SMPTE Journal "Certificates of Merit"*; and **Etsuro Saito,** *The Samuel L. Warner Memorial Medal Award.*

Dolby Laboratories, San Francisco, announced the appointment of Tom Daily as marketing manager of broadcast products. Dolby will serve as primary liaison with broadcast networks, stations and systems integrators. ■

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SONY

DSR-200A
3-CCD Digital (DVCAM) Camcorder

Combining a compact and lightweight body with the superior picture quality of DSP (Digital Signal Processing) and the DVCAM format, the DSR-200A is the ideal acquisition tool for video journalists, event and wedding videographers, stringers and production houses. 500 lines of horizontal resolution, 48kHz or 32kHz digital audio, three hour record time, and minimum illumination of 3 lux is only the beginning. Other features include 16:9/4:3 capability, Steady Shot, high resolution 1-inch viewfinder, time code operation, time/date superimposition and an IEEE-1394 interface for direct digital output. Offers full automatic as well as manual control of focus, iris, gain, white balance and shutter speed.

- Variable servo 10X optical power zoom lens goes from 5.9 to 59mm in 1.7 to 24 seconds. The manual zoom rocker is continuously variable right up to where the digital 20X zoom kicks in.
- Sony's Super Steady Shot reduces high frequency camera shake without compromising image quality. SteadyShot uses horizontal and vertical motion sensors that allow it to work accurately while zooming, moving (even shooting from a car), and shooting in low light conditions.
- Has digital effects including audio and video fade, overlap and Slow Shutter.
- Automatic and manual focus, iris, shutter, gain and white balance. Iris is adjustable in 12 levels from F1.6 to F11, shutter from 1/4 to 1/10,000 of a second in 12 steps. Gain from -3dB to +18dB in 8 steps.
- Zebra Pattern indicator, built-in ND filter.
- Custom Preset function lets you preset, store and recall custom settings for color intensity, white balance (bluish or reddish), sharpness and brightness.
- Stores Photo, Date/Time, Shutter Speed, Iris, Gain and F-stop for easy recall. So if you have to re-shoot, you know your original settings for every scene and frame.
- Records Drop/Non-Drop Frame time code. Time code can be read either as RC time code or as SMPTE time code.
- Has a large 1-inch B&W viewfinder with 550 lines of resolution for easy focusing even in low contrast lighting situations. Separate information sub panel displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder.
- Records 16-bit/48kHz audio on one stereo track or 12-bit/32kHz with two pairs of stereo tracks (L1/R1, L2/R2), so you can add stereo music or narration.
- One-point stereo electret condenser mic for clear stereo separation. Directivity can be selected from 0°, 90° & 120°.
- Automatic & manual (20-step) audio level record controls. Monitor audio with headphones or from the LCD panel which has an active VU meter.
- XLR input connectors for mics and audio equipment.

DSR-200A Field Package:
- DSR-200A Camcorder • NPA-1000/B Battery Case Adapter
- 3 NP-F930/B 7.2v 4000 mAH Batteries
- AC-V900/B AC Adapter, Triple Battery Charger
- VCT-U14 Tripod Adapter • LC-2000CP System Case

DSR-30 DVCAM Digital VCR

The DSR-30 is an industrial grade DVCAM VCR that can be used for recording, playback and editing. DV standard 4:1:1 sampling digital component recording with a 5:1 compression ratio provides spectacular picture quality and multi-generation performance. It has a Control L interface for editing with other Control L based recorders such as the DSR-200A DVCAM Camcorder or another DSR-30. It also has a continuous auto repeat playback function making it ideal for kiosks and other point of information displays. Other features include high quality digital audio, IEEE-1394 Digital interface and external timer recording. The DSR-30 can accept both Mini and Standard DVCAM cassettes for up to 184 minutes of recording time, and can playback consumer DV tapes as well.

- Records PCM digital audio at either 48kHz (16-bit 2 channel) or at 32kHz (12-bit 4 channel).
- Equipped with Control L, the DSR-30 is capable of SMPTE Time Code based accurate editing even without an edit controller. Built in editing functions include assemble and separate video and audio insert.
- By searching for either an Index point or Photo Data recorded by the DSR-200A camcorder, the DSR-30 drastically cuts the time usually required for editing. The DSR-30 can record up to 135 Index points on the Cassette Memory thanks to its 16K bits capability.
- Audio lock ensures audio is fully synchronized with the video for absolute precision when doing an insert edit.
- Built-in control tray has a jog/shuttle dial. VCR and edit function buttons. The jog/shuttle dial allows picture search at ±1/5 to 15X normal speed and controls not only the DSR-30 but also a player hooked up through its LANC interface.
- DV In/Out (IEEE 1394) for digital dubbing of video, audio and data ID with no loss in quality.
- Analog audio and video input/outputs make it fully compatible with non-digital equipment. Playback compatibility with consumer DV tapes allows you to work with footage recorded on consumer-grade equipment. Tapes recorded in the DSR-30 are also compatible with Sony's high-end DVCAM VCR's.

PVM-14N1U/14N2U & 20N1U/20N2U
13-inch and 19-inch Presentation Monitors

With high quality performance and flexibility, Sony's presentation monitors are ideal for any environment. They use Sony's legendary Trinitron CRT and Beam Current Feedback Circuit for high resolution of 500 lines as well as stable color reproduction. They also accept worldwide video signals, have a built-in speaker and are rack mountable. The PVM-14N1U/20N1U are designed for simple picture viewing, the PVM-14N2U and 20N2U add RGB Input and switchable aspect ratio.

They Feature:
- 500 lines of horizontal resolution
- They handle NTSC, NTSC 4.43, PAL, and SECAM.
- Picture (chrome, phase, contrast, brightness) and setup adjustments (volume, aspect ratio) are displayed as easy-to-read on screen menus.
- Closed captioning is available with the optional BKM-104 Caption Vision Board.

PVM-14N2U/20N2U Only:
- (Last Input Switch) Contact closure remote control allows you to wire a remote to an existing system so that the monitor's input can be remotely controlled to switch between the last previously selected input and the current input.
- 4:3/ 16:9 switchable aspect ratio

PVM-14M2U/14M4U & 20M2U/20M4U
13-inch and 19-inch Production Monitors

Sony's best production monitors ever, the PVM-M Series provide stunning picture quality, ease of use and a range of optional functions. They are identical except that the "M4" models incorporate Sony's state-of-the-art HR Trinitron CRT display technology and have SMPTE C phosphours instead of P22.

- HR Trinitron CRT enables the PVM-14M4U and 20M4U to display an incredible 800 lines of horizontal resolution. The PVM-14M2U and 20M2U offer 600 lines of resolution. M4 models also use SMPTE C phosphours for the most critical evaluation of any color subject.
- Dark tint for a higher contrast ratio (black to white) and crisper, sharper looking edges.
- Each has two composite, S-Video and component input (R-Y/B-Y, analog RGB). For more accurate color reproduction, the component level can be adjusted according to the input system. Optional BKM-101C (video) and BKM-102 (audio) for SMPTE 259M serial digital input.
- Beam Current Feadback Circuit
- 4:3/16:9 switchable aspect ratio.
- True multi-system monitors they handle four color system signals: NTSC, NTSC 4.43, PAL, and SECAM.
- External sync input and outputcan be set so that it will automatically switch according to the input selected.
- Switchable color temp: 6500K (broadcast), 9300K (pleasing picture). User preset.(3200K to 10000K).
- Blue gun, underscan and H/V delay capability.
- On-screen menus for monitor adjustment/operation.
- Parallel remote control and Tally via 20-pin connector.

QUICK DIAL 72

SONY

UVW-100B

More affordable than ever, the UVW-100B offers 700 lines of horizontal resolution, 60dB S/N ratio, 26-pin VTR interface, compact design and ease of operation– making it ideal for field shooting applications.

- Three 1/2-inch IT Power HAD CCDs with 380,000 pixels attain sensitivity of F11 at 2000 lux (low light is 4 lux). S/N ratio of 60dB and 700 lines of resolution.
- Gain-up can be preset in 1dB steps from 1dB to 18dB.
- Auto Iris detects the lighting conditions and adjusts for the proper exposure.
- Clear Scan records computer monitors without horizontal bands across the screen. Shutter speed can be set from 60.4 to 200.3 Hz in 183 steps. Also has a variable high speed shutter from 1/100 to 1/2000 of a second.
- SMPTE LTC time code and UB generator/reader. Rec Run/Free Run. Preset/Regen are easily set. For multi-camera operation, genlock to an external time code is provided.
- Genlock input and built-in color bar generator.
- 26-pin VTR interface for feeding component, composite and S-Video signals to another VTR for simultaneous recording. Sart/stop are controlled and external VTR status such as Rec and Tally are shown in the viewfinder.
- Diecast aluminum, 1.5-inch DXF-601 viewfinder is rugged yet comfortable while providing 600 lines of resolution.
- Large diameter eye cup reduces eye strain and simplifies focusing. Diopter adjustments (-3 to 0) compensates for differences in eye sight.
- Zebra level indicators, safety zone and center marker generator. Shows tape remaining and audio levels.
- 8-digit LCD display indicates time data, warning indications and video status. Battery status audio level are also shown in a bar graph meter.
- With Anton/Bauer Digital Batteries remaining battery power is displayed on the LCD panel and through the viewfinder.
- Weighs 15lb. with viewfinder, battery, tape and lens. Shoulder pad is adjustable, so you maintain optimum balance when using different lenses and batteries.

UVW-1200/UVW-1400A
Betacam SP Player • Player/Recorder

The UVW-1200 and UVW-1400A are non-editing VCRs which deliver Betacam SP quality and offer features for a wide range of playback and recording applications. RGB and RS-232 interface make them especially ideal for large screen, high quality video presentation, scientific research and digital video environments.

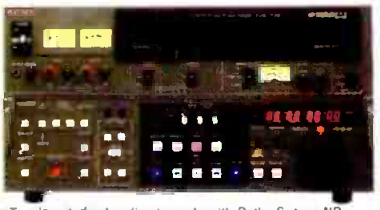
- Ideally suited for work in computer environments, because RGB signals can be converted into component signals and vice versa with minimum picture degradation.
- 25-pin serial interface allows external computer control of all VCR functions based on time code information. Baud rate can be selected from between 1200 to 38,400 bps.
- Built-In Time Base Stabilizer (TBS) locks sync and subcarrier to an external reference signal as well as providing stable pictures. High quality digital dropout compensator further ensures consistent picture performance.
- Equipped with two longitudinal audio channels.
- Both read LTC Time Code) and UB (User Bits). The UVW-1400A also generates LTC and UB (Free-Run/Rec-Run).
- Built-in character generator can display VTR status, time code, self-diagnostic messages, set-up menu, etc.
- Auto repeat of entire or a specific portion of the tape.
- Control of jog, shuttle, playback, record, pause, FF and REW with the optional SVRM-100A Remote Control Unit.
- Composite and S-Video as well as component via BNCs which are switchable to RGB output. The UVW-1400A has two switchable sync connectors and a Sync on Green.
- Built-in diagnostic function and hour meter.
- Initial set-up menu for presetting operational parameters. Settings are retained even after power is turned off.

UVW-1600/UVW-1800
Betacam SP Editing Player • Betacam SP Editing Recorder

The UVW-1600 and UVW-1800 are the other half of the UVW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. Inputs/outputs include component, composite and S-Video. **All the features of the UVW-1200/1400A *PLUS*—**

- Optional BVR-50 allows remote TBC adjustment.
- RS-422 interface for editing system expansion.
- Two types of component output: via three BNC connectors or a Betacam 12-pin dub connector.
- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation. In the insert mode of the UVW-1800, video, audio Ch-1/2 and time code can be inserted independently or in any combination.

PVW-2600/PVW-2650/PVW-2800
BETACAM SP 2000 PRO SERIES



Whenever versatility and no compromise performance is needed, there is only one choice. Legendary reliability and comprehensive support for its many users has established the PVW series as the standard in broadcast and post production. The PVW Series includes the PVW-2600 Player, PVW-2650 Player with Dynamic Tracking and the PVW-2800 Editing Recorder. They feature built-in TBCs, LTC/VITC time code operation and RS-422 serial interface. They also offer composite, S-Video and component video inputs and outputs. Most important they are built for heavy, every day duty.

- Built-in TBC's and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 TBC Remote Control.
- The PVW-2600, PVW-2650 and PVW-2800 (generates as well) read VITC/ LTC time code as well as User Bits. Ext/Int time code, Regen/Preset, or Rec-Run/ Free-Run selections.
- Built-in character generator displays time code or CTL data.
- Set-up menu for presetting many functional parameters.

PVW-2650 Only
- Dynamic Tracking (DT) playback from -1 to +3 times normal speed.
- Two longitudinal audio channels with Dolby C- type NR.
- Recognizable monochrome pictures at up to 24X normal speed in forward and reverse. Color at speeds up to 10X.
- Two types of component connection: three BNC connectors or a Betacam 12-pin dub connector. They have composite and S-Video signals as well.

PVW-2800 Only
- Built-in comprehensive editing facilities.
- Dynamic Motion Control with memory provides slow motion editing capability.

UHF WIRELESS MICROPHONE SYSTEMS

Consisting of 5 handheld and bodypack transmitters and 6 different receivers, Sony's UHF is recognized as the outstanding wireless mic system for professional applications. Operating in the 800 MHz band range, they are barely affected by external noise and interference. They incorporate a PLL (Phase Locked Loop) synthesized control system that makes it easy to choose from up to 282 operating frequencies, and with the use of Sony's pre-programmed channel plan, it is simple to choose the correct operating frequencies for simultaneous multi-channel operation. Additional features, like space diversity reception, LCD indicators, reliable and sophisticated circuit technology ensure low noise, wide dynamic range, and extremely stable signal transmission and reception. Ideal for broadcasting stations, film production facilities, and ENG work.

SEVEN DAY CUSTOMER SATISFACTION GUARANTEE

Circle (62) on Free Info Card

VIDEO and PRO AUDIO

NewTek

QUICK DIAL 731

Calibar 3-Oz. Pocket-Sized Test Generator

The size of a ball point pen and running on a single battery, Calibar is an NTSC test signal generator that packs a rack mount's worth of test equipment into a battery operated instrument. Calibar is the fastest, easiest and most portable way ever to calibrate video equipment. No patch bay racks. Just one cable. So besides giving you fast, accurate readings in the studio, it's perfect for off-site events or trouble-shooting in the field.

- Designed for studio and field operation, it produces 24 test pattern functions at the touch of a button. 10-bit precision digital-to-analog conversion assures highly accurate signals.
- Calibar's combination of low cost, portability and full-featured operation makes it ideal for broadcast engineers, television production facilities and video post houses.
- Tuck Calibar in your pocket and you're ready to go. Touch the button to generate SMPTE color bars, touch it again to calibrate convergence and so on.
- With the supplied AC adapter, it also functions as a black burst generator.

CHYRON PC-CODI & PC Scribe

Text and Graphics Generator and Video Titling Software

PC-CODI incorporates a broadcast quality encoder and a wide bandwidth linear keyer for the highest quality, realtime video character generation and graphics display. A video graphics software engine running under Windows 95/NT. PC Scribe offers a new approach and cost effective solution for composing titles and graphics that is ideal for video production and display applications. Combined, their a total solution for real-time character generation with the quality you expect from Chyron.

PC-CODI Hardware:

- Fully-antialiased displays • Display and non-display buffers
- Less than 10 nanosecond effective pixel resolution
- 16.7 million color selections • Fast, realtime operations
- Character, Logo and PCX Image transparency
- Variable edges: border, drop shadow and offset
- Full position and justify control of character and row
- User definable intercharacter spacing (squeeze & expand)
- Multiple roll/crawl speeds • Automatic character kerning
- User definable tab/template fields
- Shaded backgrounds of variable sizes and transparency
- Software controlled video timing
- User definable read effects playback, wipes, pushes, fades
- NTSC or PAL sync generator with genlock
- Board addressability for multi-channel applications
- Auto display sequencing • Local message/page memory
- Preview output with safe-title/cursor/menu overlay
- Composite and S-video input with auto-genlock select

PC-Scribe Software:

- Number of fonts is virtually unlimited. Also supports most International language character sets. Fonts load instantly and the level of anti-aliasing applied is selectable.
- Adjust a wide range of character attributes. Wide choice of composition tools.
- Characters, words, rows and fields can color flash.
- Characters rolls, crawls and reveal modes. Speed is selectable and can be auto timed with pauses. Messages can be manually advanced or put into sequences along with page transitions.
- Multiple preview windows can be displayed simultaneously.
- Transitions effects include: cut, fade, push, wipe, reveal, peel, zoom, matrix, wipe, spiral, split, weave and jitter.
- Import elements to build graphics. This includes OLE objects, INFINITI RGBA and TGA with alpha channel. Scribe also imports and exports TIFF, JPEG, PCX, TGA, BMP, GIF, CLP, ASCII, IMG, SGI, PICT and EPS formats.

PC-CODI and PC-Scribe Bundle.....2995.00

TRUEVISION / AVID

TARGA 1000/MCXpress NT

Professional Video Production Workstation

Incorporating the award-winning TARGA 1000 video card and Avid MCXpress NT non-linear editing software, this fully-configured workstation meets the needs of production professionals, corporate communicators, educators and Internet authors.

TARGA 1000 Features:

The TARGA 1000 delivers high processing speed for video and audio effects, titling and compositing. Capture, edit and playback full-motion, full-resolution 60 fields per second digital video with fully synchronized CD-quality audio.

- Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space. Has composite and S-video inputs/outputs. Also available with component input/output (TARGA 1000 PRO).
- Genlock using separate sync input for working in professional video suites.
- Audio is digitized at 44.1KHz or 48KHz sampling rates, for professional quality stereo sound. Delivers perfectly synchronized audio and video.

MCXpress Features:

The ideal tool for video and multimedia producers who require predictable project throughput and high-quality results when creating video and digital media for training, promotional/marketing material, local television and cable commercials, CD-ROM and Internet/intranet distribution. Based on Avid's industry-leading technology, it combines a robust editing functionality with a streamlined interface. Offers integration with third-party Windows applications, professional editing features, powerful media management, title tool and a plug-in effects architecture. It also features multiple output options including so you save time and money by reusing media assets across a range of video and multimedia projects.

TARGA 1000/MCXpress Turnkey Systems:

- 300-watt 6-Bay Full Tower ATX Chassis
- Pentium ATX Motherboard with 512K Cache
- Pentium II- 300 MHz Processor
- Matrox Millenium II AGP 4MB WRAM Display Card
- 64MB 10ns 168-Pin (DIMM) S-DRAM
- Quantum Fireball 6.4GB IDE System Drive
- Seagate Barracuda External 9.1GB SCSI-3 Ultra Wide Capture Drive
- Adaptec AHA-2940UW Ultra Wide SCSI-3 Controller Card
- Teac CD-532e 32X EIDE Internal CD-ROM Drive • 3.5" Floppy Drive
- Altec-Lansing ACS-48 3-Piece Deluxe Speaker System
- Viewsonic G771 17-inch (1280 x 1024) Monitor (0.27mm dot pitch)
- Focus 2001A Keyboard • Microsoft MS Mouse
- Windows NT 4.0 Operating System Software
- Avid MCXpress for Windows NT
- Truevision TARGA 1000 or 1000 Pro Video Capture Card

With TARGA 1000.....$5995.00
With TARGA 1000 Pro (component input/output).....$6495.00

KNOX VIDEO

RS4x4/8x8/16x16/16x8/12x2

Video/Audio Matrix Routing Switchers

Knox's family of high performance, 3-channel routing switchers are extremely versatile, easy-to-use and very affordable. Housed in an ultra-thin rackmount chassis they accept and route (on the vertical interval) virtually any video signal, including off-the-air and non-timebase corrected video. They also route balanced or unbalanced stereo audio. The audio follows the video or you can route the audio separately (breakaway audio). Each of the switchers offers manual control via front panel operation. They can also be controlled remotely by a PC, a Knox RS Remote Controller, or by a Knox Remote Keypad via their RS-232 port. Front panel LEDs indicate the current routed pattern at all times. Knox switchers are ideal for applications such as studio-feed control and switcher input control, plus they have an internal timer allowing timed sequence of patterns for surveillance applications as well.

- Accept and routes virtually any one-volt NTSC or PAL video signal input to any or all video outputs.
- Accept and route two-volt mono or stereo unbalanced audio inputs to any or all audio outputs.
- Video and audio inputs can be routed independently - they don't need to have the same destination.
- Can store and recall preset cross-point patterns. (Not available on RS12x2.)
- Front panel key-pad operation for easy manual operation.
- Can also be controlled via RS-232 interface with optional RS Remote Controller or Remote Keypad.
- Front panel LED indicators display the present routing patterns at all times.
- An internal battery remembers and restores the current pattern in case of power failure.
- Internal vertical interval switching firmware allows on-air switching.
- Housed in a thin profile rackmount 1" chassis.
- Also except the RS12x2 are available in S-Video versions with/without audio.
- Models RS16x8 and RS16x16 are also available in RGB/component version.
- With optional Remote Video Readout, the RS16x8 and RS16x16 can display active routes on a monitor at remote locations, via a composite signal from a BNC connector on the rear panel.
- The RS4x4, RS8x8 and RS16x16 are also available with balanced stereo audio. They operate at 660 ohms and handle the full range of balanced audio up to +4 dB with professional quick-connect, self-locking, bare-wire connectors.

LEADER

Manufacturing test and measurement equipment for over 40 years, Leader Instruments is the standard which others are measured against for reliability, performance, and most important—cost effectiveness.

5860C WAVEFORM MONITOR

A two-input waveform monitor, the 5860C features 1H, 1V, 2H, 2V, 1 s/div and 2V mag time bases as well as vertical amplifier response choices of flat, IRE (low pass), chroma and DIF-STEP. The latter facilitates easy checks of luminance linearity using the staircase signal. A PIX MON output jack feeds observed (A or B) signals to a picture monitor, and the unit accepts an external sync reference. Built-in calibrator and on-off control of the DC restorer is also provided.

5850C VECTORSCOPE

The ideal companion for the 5860C, the 5850C adds simultaneous side-by-side waveform and vector monitoring. Featured is an electronically-generated vector scale that precludes the need for fussy centering adjustments and eases phase adjustments from relatively long viewing distances. Provision is made for selecting the phase reference from either A or B inputs or a separate external timing reference.

5100 4-Channel Component / Composite WAVEFORM

The 5100 handles three channels of component signals, plus a fourth channel for composite signals, in mixed component / composite facilities. Features are overlaid and parade waveform displays, component vector displays, and automatic bow-tie or "shark fin" displays for timing checks. Menu-driven options select format (525/60, 625/50, and 1125/60 HDTV), full line-select, vector calibration, preset front-panel setups and more. On-screen readout of scan rates, line-select, preset numbers, trigger source, cursor time and volts.

5100D Digital Waveform/Vectorscope

The 5100D can work in component digital as well as component analog facilities (and mixed operations). It provides comprehensive waveform, vector, timing and picture monitoring capabilities. Menu driven control functions extend familiar waveform observations into highly specialized areas and include local calibration control, the ability to show or blank SAV/EAV signals in both the waveform and picture, the ability to monitor digital signals in GBR or YCbCr form, line select (with an adjustable window), memory storage of test setups with the ability to provide on-screen labels, flexible cursor measurements, automatic 525/60 and 625/50 operation and much much more.

5870 Waveform/Vectorscope w/SCH and Line Select

A two-channel Waveform/Vector monitor, the microprocessor-run 5870 permits overlaid waveform and vector displays, as well as overlaid A and B inputs for precision amplitude and timing/phase matching. Use of decoded R-Y allows relatively high-resolution DG and DP measurements. The 5870 adds a precision SCH measurement with on-screen numerical readout of error with an analog display of SCH error over field and line times. Full-raster line select is also featured with on-screen readout of selected lines, a strobe on the PIX MON output signal to highlight the selected line, and presets for up to nine lines for routine checks.

5872A Combination Waveform/Vectorscope

All the operating advantages of the 5870, except SCH is deleted (line select retained), making it ideal for satellite work.

5864A Waveform Monitor

A two-input waveform monitor that offers full monitoring facilities for cameras, VCRs and video transmission links. The 5864A offers front panel selection of A or B inputs, the choice of 2H or 2V display with sweep magnification, and flat frequency response or the insertion of an IRE filter. In addition, a switchable gain boost of X4 magnifies setup to 30 IRE units, and a dashed graticule line at 30 units on screen facilitates easy setting of master pedestal. Intensity and focus are fixed and automatic for optimum display. Supplied with an instruction manual and DC power cable.

5854 Vectorscope

A dual channel compact vectorscope, the 5854 provides precision checkout of camera encoders and camera balance, as well as the means for precise genlock adjustments for two or more video sources. Front panel controls choose between A and B inputs for display and between A and B for decoder reference. Gain is fixed or variable, with front panel controls for gain and phase adjustments. A gain boost of 5X facilitates precise camera balance adjustments in the field. Supplied with a DC power cable.

Designed for EFP and ENG (electronic field production and electronic news gathering) operations, they feature compact size, light weight and 12 V DC power operation. Thus full monitoring facilities can be carried into the field and powered from NP-1 batteries, battery belts and vehicle power. Careful thought has been given to the reduction of operating controls to facilitate the maximum in monitoring options with the operating simplicity demanded in field work.

Professional Services

Classifieds

For Sale

Classifieds

For Sale

Services

Help Wanted

CHIEF ENGINEER

Channel 7/WKBW-TV, leading ABC affiliate in Buffalo, NY, is looking for a Chief Engineer to direct the total engineering function of the television station in accordance with government rules and regulations, corporate policies, labor contracts and good engineering practice in a manner that enhances inter-departmental cooperation, technical excellence, and station profitability. Knowledge of analog and digital technology required. Must have college degree with five years broadcast engineering experience, and two years supervisory experience in either RF or maintenance and techniques of FCC compliance.

Send letter and resume to:
Bill Ransom, President and General Manager
Channel 7/WKBW-TV
7 Broadcast Plaza, Buffalo, New York 14202

No phone calls please. Channel 7/WKBW-TV is an equal opportunity employer.

ENGINEERING SUPERVISOR

Familiar with vtrs, switchers, studio cameras, experience with satellite, microwave, UHF transmitter, and computer experience required. Must be fully versed in FCC regulations. Please mail or fax your resume, cover letter, and salary requirement to: Joon S. Joo, VP, WMBC-TV 63, PO Box 985, Lake Hopatcong, NJ 07849, Fax: (973)697-5515 WMBC-TV is an equal opportunity employer.

Help Wanted

CARIBBEAN OPPORTUNITY-
Maintenance Engineer, Television

Cayman International Television Network / Cayman Television Service requires a top-notch engineer for a television facility in a small but sophisticated market. Position calls for a well-rounded technical professional with the ability to repair and troubleshoot on a variety of equipment, including UHF transmitters, broadcast, MMDS and tape machines. Familiarity with M2 a plus. Please reply with resume and letter via fax to (345) 945-1373 or Mail to P.O. Box 30563 SMB, Grand Cayman, Cayman Islands BWI

Classifieds

Help Wanted

Broadcast Engineers

WABC-TV has excellent opportunities for the right candidates in the #1 television market in the country. We have several positions available for experienced Broadcast Engineers at WABC in New York.

STUDIO MAINTENANCE ENGINEER- Must be able to perform the following duties: install and maintain studio and transmission equipment including video switchers, audio consoles, DVE, CG, SS, cameras and robotics. Familiarity with automation systems and master control environment. Should possess a general computer/networking background. Must be able to work on a rotating shift schedule.

MEDIA CENTER MAINTENANCE ENGINEER- Must be able to perform the following duties: install and maintain equipment in a post production and non-linear edit-room environment. Must be able to work on beta, 3/4 and 1" tape machines. Willingness to work outside in remote/live environment to support field operations as needed Ability to work on ENG field equipment including cameras.

RF MAINTENANCE ENGINEER- Must be able to perform the following duties: install and maintain RF related equipment in a studio, transmitter and remote site environment. Must be able to work on VHF/UHF solid state transmitters and all associated transmitter equipment. Ability to align and repair microwave TX/RX and all wireless equipment such as microphones and IFB. Knowledge of FCC rules and regulations.

You must possess knowledge of analog/digital systems and a minimum of five years broadcast television experience. Applicants must able to do component level repair and work well under pressure. Candidates should have an engineering degree or equivalent technical training. SBE/FCC certification is a plus.

If you want to be a part of the exciting transition to HDTV in the most exciting city in the world, please send your resume and cover letter to **Kurt Hanson, WABC-TV, 7 Lincoln Square, New York, NY 10023** (No phone calls/faxes). We are an equal opportunity employer.

abc 7

WE PLACE ENGINEERS
TV, POST, SATELLITE, VIDEO

KEYSTONE INT'L., INC.
Dime Bank Bldg., 49 S. Main St.
Pittston, PA 18640, USA
Phone (717) 655-7143
Fax/Resume (717) 654-5765

WTAE•TV 4 PITTSBURGH

TV MAINTENANCE ENGINEER

WTAE•TV, the Hearst-Argyle ABC affiliate in Pittsburgh, has an immediate need for an experienced maintenance person. Ideal candidate would be familiar with small format tape machines, switchers, audio consoles, studio cameras, ENG, SNG, and automation equipment. Should have strong interest in computers and digital technology. Minimum three (3) years' experience. SBE certification preferred. For consideration send resume and cover letter including source of referral to:

CODE ME-0527
WTAE•TV
400 Ardmore Boulevard
Pittsburgh PA 15221-3090
EOE/M-F

Hearst-Argyle
TELEVISION, INC.

Maintenance Engineer

THE WEATHER CHANNEL, Atlanta, GA is looking for a motivated and reliable individual to join our team. This is an excellent opportunity for someone who wants to expand their knowledge. The selected candidate, for maintenance Engineer, must have at least three years experience repairing and maintaining Broadcast related equipment. You will be part of the Engineering team dedicated to maintaining a brand new, State-of-the-art digital facility. Computer proficiency preferred. Please fax resumes to The Weather Channel, Director of Engineering (770) 226-2943 or send them: 300 Interstate North Parkway, Atlanta, GA 30339 EOE/M/F.

BROADCAST MAINTENANCE ENGINEER

A top ten market, sports network is currently seeking a qualified engineer with five years of related maintenance experience. This candidate should be capable of repairing television equipment to the component level. Must possess knowledge of Sony BETA format, digital switchers and Avid equipment. PC and Macintosh literacy a plus. Position also entails EIC operations for live broadcasts. Must be able to work as a team member as well as independently. We offer a competitive salary and benefits package. E.O.E. Please send resume to *Chief Engineer, 70 Brookline Avenue, Boston, Ma 02215.*

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Turner Broadcasting System has career opportunities for experienced television engineers. These career positions demand an extensive background in equipment maintenance, digital video and audio, and knowledge of computer systems and networks. Please mail or fax your resume and cover letter to:

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Assistant Vice President
of Engineering Services
Turner Broadcasting System, Inc.
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CHIEF ENGINEER WTVY-TV (CBS for Dothan and the Gulf Coast) has an immediate opening for a Chief Engineer. Experience with Harris transmitters, ENG operations, microwave systems, and computer systems. SBE certification, FCC General Class license, management experience and five years in broadcast engineering is preferred. Send resume, salary history, and references to Human Resource, WTVY-TV, P.O. Box 1089, Dothan, AL 36302. Fax 334-793-3947. Benedek Broadcasting/WTVY-TV is an Equal Opportunity Employer.

ASSISTANT CHIEF ENGINEER WTVY-TV4 (CBS for Dothan and the Gulf Coast) seeks a hands-on maintenance engineer ready to move to a supervisory level. The candidate will help supervise the engineering department as well as repair and install television equipment. Knowledge of VHF transmitters, DVC-PRO, digital servers, microwaves and computers can put you at the head of the line. Must be able to work as a team member as well as independently. Availability to work all shifts, including early mornings, nights and weekends is an absolute must. Send resume, salary history, and references to Human Resource, WTVY-TV, P. O. Box 1089, Dothan, AL 36302. Fax 334-793-3947. Benedek Broadcasting, WTVY-TV is an Equal Opportunity Employer.

TRANSMITTER/STUDIO BROADCAST ENGINEER WTVY-TV4 (CBS for Dothan and the Gulf Coast) seeks a television maintenance engineer with hands-on to componenet level experience. Knowledge of VHF/UHF full power transmitters, videotape machines, computers, camera and microwave repair as well as FCC/FAA compliance is required. Ability to work independently and as a team member, rotating on-call weekend shift, lifting up to 70 pounds as needed, and working with other departments to provide technical support. Availability to work all shifts is an absolute must. Send resume, salary history, and references to Human Resource, WTVY-TV, P. O. Box 1089, Dothan, AL 36302. Fax 334-793-3947. Benedek Broadcasting/WTVY-TV is an Equal Opportunity Employer.

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Help Wanted

MAINTENANCE ENGINEER

Move to Phoenix before winter begins! Join the AVR team and work for the fastest growing dealership in the southwest Mon. thru Fri. 8-5. We are looking for a candidate with the right attitude to repair and maintain broadcast level VTR's, cameras, and associated equipment. Experience should include 5 years in a station or dealership environment preferably with factory training on Sony, JVC, and Panasonic equipment. Generous salary, benefits, & 401K. Drug test required. Fax resume to J. L. @ (602) 274-7416

SENIOR MAINTENANCE ENGINEER The Christian Broadcasting Network (CBN) is seeking two seasoned Maintenance Engineers to fill key positions in its Television Engineering department. Headquartered in beautiful Virginia Beach, Virginia, this dynamic organization broadcasts in over 70 nations and is recognized internationally for its humanitarian and evangelistic efforts. This individual will provide maintenance support for electronic equipment used in various functions by CBN's television Operations Group. The successful candidate will possess the following qualifications: Experience as a Senior Maintenance Engineer for a television station; experience with NTSC, PAL, SECAM and broadcast/recording formats; and experience in television production, post production, studio and remote production. The ability to distinguish colors as related to monitor service, adjustment and operation is required. Strong communication skills are a must. CBN offers a competitive salary and excellent benefits package. If you meet the listed criteria and share our vision and purpose, call our 24-hour line (800) 888-7894 to request an application. Resumes can be faxed to (757) 226-3899. Visit our website at www.cbn.org, resumes can be emailed through our site.

FULL-SERVICE ENGINEERING, implementation, management and technical consulting firm seeking highly qualified individual to join Engineering Department. Must be experienced in the analysis, design and management of broadcast, cable and related media communications systems. Requires people management and interdepartmental communications experience, as well as knowledge of equipment, current trends and technical developments in the industry. Fax or send resume and salary requirements to: Human Resources, Communications Engineering, 8580 Cinderbed Road Suite 800, Newington, Va 22122. Fax # 703-550-5180.

MAINTENANCE ENGINEER WPSG-TV is currently seeking a broadcast maintenance engineer. Responsibilities include installation, troubleshooting, and repair. 5 years experience and degree preferred. Letter of application and resume to "EMS" Dept. 573, WPSG-TV, UPN 57, 420 N. 20th St., Phila, PA 19130. Equal Opportunity Employer.

MAINTENANCE ENGINEER/SNV Ability to maintain studio and transmitter electronic equipment according to manufacturers' specifications, station policy and FCC regulations, and perform repairs to the component level, inspections, calibrations and adjustments so as to assure high standards of all audio and video signals. Ability to operate Satellite News Gathering Unit a must. Knowledge of FCC Regulations required. Valid Oklahoma CDL and FCC General Class license required. Send resume with salary history to: Personnel, KFOR-TV, P. O. Box 14068. Oklahoma City, OK 73113. EOE

TELEMUNDO/KSTS-TV, San José, California, is seeking a qualified Video Maintenance Engineer. 3 years minimum experience in installation and maintenance of broadcast equipment. Responsibilities include diagnosis, analysis, repair and preventive maintenance for studio & News Dept. Strong comuter skills desired. Competitive salary and excellent benefits. Submit detailed resume to Robert Amoroso, KSTS-TV, 2349 Bering Drive, San José, CA 95131. EOE.

ENGINEERING SUPERVISOR Telemundo/KSTS-TV in San José, California, a Telemundo owned and operated station, is seeking an Engineering Supervisor for its studio operation. The candidate should possess an Associated Degree in Electronics and a minimum of 5 years experience in the repair of SP beta machines, cameras, studio production equipment, video servers, and have a solid background in computer systems. Strong analog and digital troubleshooting skills a must as is the ability to communicate well with others. Managerial skills, FCC Radiotelephone Operator License, SBE Certification and UBF Transmitter experience desirable. Send resume, salary history and cover letter to: Robert Amoroso, Director of Engineering and Operations, Telemundo/KSTS-TV, 2349 Bering Dr., San José, CA 95131 or Fax: 408/432-6218. EOE.

SNG/ENG ENGINEER Dominant TV station in upstate NY market has full-time opening for ENG engineer responsible for operation & maintenance of SNG/ENG trucks, VTRs & related A/V equip. Excellent benefits, inc. 401K. Send resume to: Dane Kistner, Chief Engineer, WKTV NewsChannel 2, PO Box 2, Utica, NY 13503 EOE

MAINTENANCE TECHNICIAN Requires self starter having experience with Beta, VPR-3, PC's, DVC PRO, and other studio equipment maintenance. Experience with microwave, satellite, VHF & UHF transmitters, CADD ability and FCC General Class Licenses preferred. Contact Charles Hofer, Manager of Engineering Maintenance, WTNH-TV, 8 Elm Street, New Haven, CT 06510. No phone calls please. EOE

NETWORK CHIEF ENGINEER AND SYSTEMS CHIEF ENGINEER - two positions open, for Oregon Public Broadcasting. OPB, a successful community licensed network located in the Pacific Northwest, is one of the top ten stations producing programming for PBS, as well as enjoying relationships with national and international networks. Network CE responsible for day-to-day management of operation and maintenance of all network center broadcast equipment, including supervising engineering staff. System CE responsible for technical excellence of the operation of OPB's statewide radio and television network, including supervising five chief engineers. OPB is a leader in the digital revolution; and both positions will have a role in OPB's planning for transition to digital TV. Requires five years experience with extensive, demonstrable skills in all technical aspects of broadcasting; knowledge of technical design, construction, maintenance and operation of same; strong communication skills and ability to build good working relationships. Must be resourceful, self-starter; able to make independent decisions; handle administrative paperwork. Supervisory experience required. OPB offers a competitive salary plus generous benefits package. To apply, send cover letter, resume and salary history to OPB Personnel, Mail Stop BE, 7140 SW Macadam Avenue, Portland, OR 97219. Application materials accepted until position is filled. Equal opportunity employer.

ASSISTANT CHIEF ENGINEER/MIS WCSC-TV Engineering Department is seeking an Assistant Chief Engineer/MIS person. Maintenance of studio, XMTR, and E.N.G. equipment to the component level, maintenance of computer equipment to the board and system level. Administration of a LAN. You are required to wear a beeper and be available at all hours for emergencies, possess good people skills and be a self starter and a leader. Send resume to WCSC-TV, Human Resources Manager, 2126 Charlie Hall Blvd., Charleston, SC 29414. WCSC is an equal employer and a division of Jefferson-Pilot Communications.

ASSISTANT CHIEF ENGINEER AM-FM-TV combo (PBS/NPR). You have 4-year degree plus 5 years experience and want to grow. We offer secure, professional leadership position. Not less than $40,000 plus exceptional benefits. Call or email for complete job description and application package: Marge Moluf--217-333-0850 / m-moluf@uiuc.edu. Equal Opportunity / Affirmative Action Employer

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BENCH TECH Maintenance Technician, troubleshoot, repair, install studio/microwave/transmitter equipment. 2 years technical education and 5 years experience in repair and maintenance of broadcast equipment. Experience maintaining DVCpro; Infinite, Avid NewsCutters, air-play, media composer, Panasonic camcorders helpful. Resume to Personnel, NBC33, 2633 W. State Blvd., Fort Wayne, IN 46808. No calls accepted. E.O.E.

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Help Wanted

BROADCAST ENGINEER Pima Community College Community Campus Starting Compensation from: $39,631 - $45,292 (Depending on qualifications & experience) plus an Exceptional Benefits Package CLOSING DATE: December 7, 1998 Pima Community College located in Tucson, Arizona is the fifth-largest multi-campus community college in the nation and opens its doors to more than 53,000 credit and non-credit students each year. Five campuses offer university transfer programs, occupational, developmental and general education and corporate training and community education courses. The Community Campus is responsible for district-wide telecommunications, business and professional training, research and development for instructional community needs assessment, innovative and core curriculum, and exploratory site development. This position is responsible for directing and coordinating the operation of television cablecasting and satellite-delivered training and teleconferences in accordance with rules and regulations of Federal Communications Commission; performing a variety of technical support to production team, faculty, and audio/video staff in repair, maintenance, installation, construction modification, and design of equipment; operating compressed-video multi-point system and coordinating transmission of multi-media graphics and data over computer networks. Tucson is located in a lush desert valley surrounded by four mountain ranges. A multicultural, southwestern city with more than 750,000 people in the metropolitan area, it is renowned for its rich heritage and superb weather. For application contact: Pima Community College Human Resources 4905-D E. Broadway Blvd. Room 102 Tucson, AZ 85709-1190 Toll-Free 1-877-746-2562 Phone: (520) 206-4624 Fax:(520) 206-4662 TTY For the Hearing Impaired: (520) 206-4852 http://www.pima.edu/-humres/hrhome.html ADA accom avail EEO/AA

MAINTENANCE ENGINEER POSITION San Jose, Ca. ABC affiliate is currently seeking a Studio / ENG News Equipment Maintenance Engineer. Qualified candidates must have experience installing and maintaining both digital and analog video / audio broadcast studio equipment. Component level trouble analysis and repair of equipment problems will be required. Experience with Newsroom computer systems and general Ethernet networks will be a plus. This job location will mainly be at our San Jose facility and require both night and weekend shift work. A degree or equivalent experience and FCC / SBE certification is preferred. KNTV is a Granite Broadcasting Station, with an excellent benefit package and opportunity for advancement. Send your resume, cover letter and references to the Personnel Department, KNTV, 645 Park Ave., San Jose, CA. 95110. KNTV is an EOE Employer.

CHANNEL YOUR CAREER TO ECHOSTAR Echostar's, Satellite Digital Broadcast Center, is Cheyenne, WY's premier employer, and is the heart of Echostar's direct broadcast satellite (DBS) system. The facility broadcasts and receives video, audio and data information from various satellites including its own Echostar I, II, III, & IV. Echostar and its Dish Network now give consumers a high quality, competitive alternative to over-priced cable services. Opportunities exist now for the following positions: Broadcast Engineers, Video Maintenance Technician, Broadcast Engineering Manager, Data Broadcast Network Engineer, Production Coordinator, Studio Engineer (Denver Area), Senior Videotape Editor, Quality Assurance Supervisor. To learn more about these and other job opportunities please visit our web site at www.dishnetwork.com. If you are eager to be part of a vision that is changing the way the world communicates by providing innovative technology, quality products and dynmaic services, then send your resume and salary history to: Echostar Satellite Digital Broadcast Center Attn: Human Resources - BT, 530 Echostar Drive, Cheyenne, WY 82007-9638. Or e-mail your resume to: HR.Cheyenne@echostar.com. We will also accept faxed resumes at 307-633-5533. Echostar is an Equal Opportunity Employer

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GROWING SATELLITE COMMUNICATION'S COMPANY seeks personnel for Data and Video Communications area. Shift and weekend work required. Knowledge of RF and Data Com preferred. Military satellite training a plus. Send resume to P.O. Box 14070, Pittsburgh, PA 15239, Attn: Personnel, E.O.E.

BROADCAST ENGINEERING ASSISTANT ADMINISTRATOR The Educational Communications Board, partners in the Wisconsin Public Television and Radio services statewide, has an opening for a senior managment position as Assistant Administrator of the Delivery Division. Responsible for the day-to-day planning, development, and ongoing management of all delivery functions for statewide public radio, public television, satellite systems, ITFS, and Emergency Weather Service systems. This position will also have primary project responsibility for leading the network through the conversion to digital television and eventually digital radio. Successful applicants will have a degree in Electrical Engineering and 5-10 years of professional and managerial experience in broadcast engineering or equivalent. Preference will be given to applicants with a thorough knowledge of digital and emerging technologies and computer assisted systems. The salary range for this position is $48,182 to $77,464 and includes an excellent benefit package. Location: Madison, WI. For application materials contact ECB Personnel at (608) 264-9669. Applications must be returned by December 15, 1998. An Equal Opportunity Employer.

CORPORATE CHIEF ENGINEER Progressive Communications Company is seeking a new corporate chief engineer to oversee the technical operations for a group of television stations in accord with FCC regulations. Candidate will also be responsible for overseeing all equipment and property maintenance, assuring operation within Federal and State safety regulations and in accord with good engineering practice. Other responsibilities will include overseeing the compiling of engineering data for FCC licenses, permits and the posting of all licenses and authorizations as required. Candidate must also be able to design and layout new equipment installations and evaluate and recommend capital expenditures for the stations. Requirements include a two-year Associate Degree in Electronic Technology or commensurate experience. Experience should include 5 years supervisory experience, and 3 years as a Chief Engineer. Requirements also include technical knowledge of design and construction of broadcast facilities. A knowledge of DTV requirements and the ability to direct the installation of the new digital facilities as well as knowledge of budgets and the ability to negotiate contracts with equipment providers is also required. Please send resume to: Christine Shreaves Human Resources 150 River Street Hackensack, NJ 07601

MAINTENANCE ENGINEER WNDY UPN 23 has an immediate opening for a qualified maintenance engineer. Three (3) years minimum experience in maintenance of broadcast equipment with UHF transmitter experience and strong computer skills a plus. WNDY-TV, a Paramount station, is a totally digital file server-based operation. Submit a detailed resume to: Placement Office, WNDY-TV, 4551 W. 16th Street, Indianapolis, IN 46222. No phone calls please. WNDY-TV is an Equal Opportunity Employer

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MAINTENANCE ENGINEER WGKI-TV Cadillac, Michigan is looking for an experienced technician who likes challenges. Applicant must have 3-5 years experience in installation, maintenance of studio equipment, and basic transmitter and satellite operations. Send resume and references to Gary Knapp, General Manager, WGKI-TV, 7669 S. 45 Road, Cadillac, MI 49601. EOE

MAINTENANCE ENGINEER Florida's sun and sand are calling you. WFTX-TV, the FOX affiliate in the Fort Myers market, is seeking a self-motivated Maintenance Engineer. Experience with station systems, component level repair, cameras, Odetics TCS2000, 3/4", Beta, ENG and News experience a must. All new Digital-S news department. SBE certification and UHF experience are desirable. Second shift hours. Please send resume and salary requirements to: Ryan Steward, Chief Engineer, WFTX-TV, 621 SW Pine Island Road, Cape Coral, FL 33991. E-Mail: rsteward@wftx.com. We are an equal opportunity employer.

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EOM

NEEDED: analog engineers

BY PAUL MCGOLDRICK

As a breed, broadcast engineers have never been that expensive. Compared to other engineering niches, we have generally been underpaid, even though, in many cases, our workloads have differed. We all feel some kind of resentment if our power is out for more than a couple of hours, and I thoroughly respect the guys who have to venture out in lousy weather to repair downed power lines. Heavy rain or snow, mixed with electricity, is just not my favorite kind of working environment.

But I, like many of my peers and colleagues, have had to sit it out in bad conditions, either because I was already on site, or because conditions got worse after I arrived. The longest I was stuck was 21 days at a transmitter site in the English Pennines. Early on, we lost the incoming TV feeds, but we managed to keep the generators going and had enough power to keep the radio services on-air, to cook, and to keep the antennas from icing. (You can always tell the visitors from the workers at a transmitting station by where they park in icy conditions.) During those 21 days, overtime started after the first eight-hour shift.

Over the years, the demands on broadcast engineers have increased. In most cases, this includes being on call 24/7 and having less and less to work with. A few years ago, on a visit to a station billed on many North American cable systems as a superstation, I was given the inevitable tour by the chief engineer. A very proud man, he had great rationale for just about every piece of equipment he had purchased. But he was also in despair: His staff had been cut from a total engineering group of 12 down to two working engineers and an assistant. In the newsroom, he explained that they were keeping the VTRs running long after they should have been junked.

The station was going for the bottom line: As long as everything kept working, they assumed the cuts they made were having no effect and therefore were justified. Cool logic. This chief engineer had even thought of sabotage as a way of getting management's attention, but he just couldn't do it. He was stuck between greedy owners and his own decency.

Talent shortage

Many now agree that, with the changeover to DTV, there is a building shortage of broadcast engineering talent. With the exception of a few network facilities' internship programs, we certainly haven't encouraged engineers to adopt our profession. I am not aware of any formal engineering training courses devoted to producing the overall professional (not just understanding one or two pieces of equipment). And there has been no frenzied activity in the direction of increasing rewards for engineers — or of bringing back staff that have been laid off and gone to other disciplines.

. . . there is a building shortage of broadcast engineering talent.

But the great surprise in all of this is that the shortage in engineering talent does not seem to be in the digital areas. Stations that have begun DTV transmissions this month have generally depended on systems houses and consultants to get the transmissions up and running. Manufacturers have been lending heavy support and getting deliverable equipment right up to the starting line. Once installed, most of this DTV equipment is going to be more reliable, more stable and require less preventive maintenance than any that came before.

A high percentage of the mistakes are likely to be in the PC arena, with exactly the same problems that we all have, because today's software is far from perfect. The machine this is being written on has been in a foul mood for more than a week — apparently the latest downloaded updates for Norton Anti-Virus are treating the data on CDs as hostile aliens. For such problems we are all beholden to the often dubiously titled "help lines" for the applications, and some common sense.

So it appears that the greatest shortage during this changeover is for analog engineers. Understanding systems, interconnects, power, STLs and RF is more and more important with the new facility. When I was trained in the BBC, the emphasis was on systems. You weren't expected to know every circuit inside a camera to be able to find a problem. You were expected to understand how the whole thing talked within itself, what it needed to work in terms of signals.

There is no such training anymore. Even where they exist, analog-engineering courses dwell on single-circuit concepts, which seem to produce more design engineers. These successful students will earn more money going into manufacturing, where an analog IC designer can earn $70,000 in the first year and can get stock options.

Know any broadcast stations offering stock options? ■

Paul McGoldrick is an industry consultant based on the West Coast.

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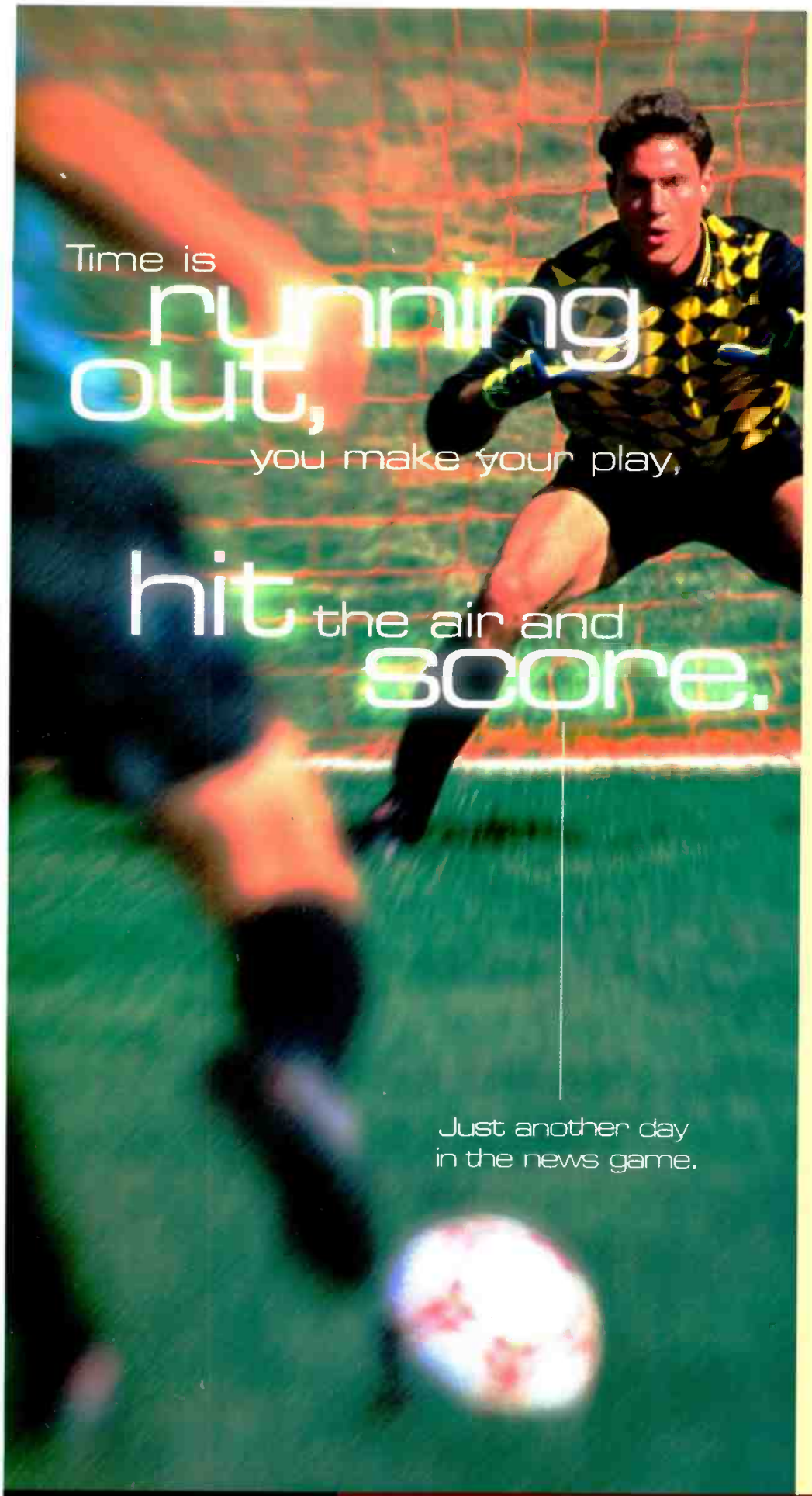

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